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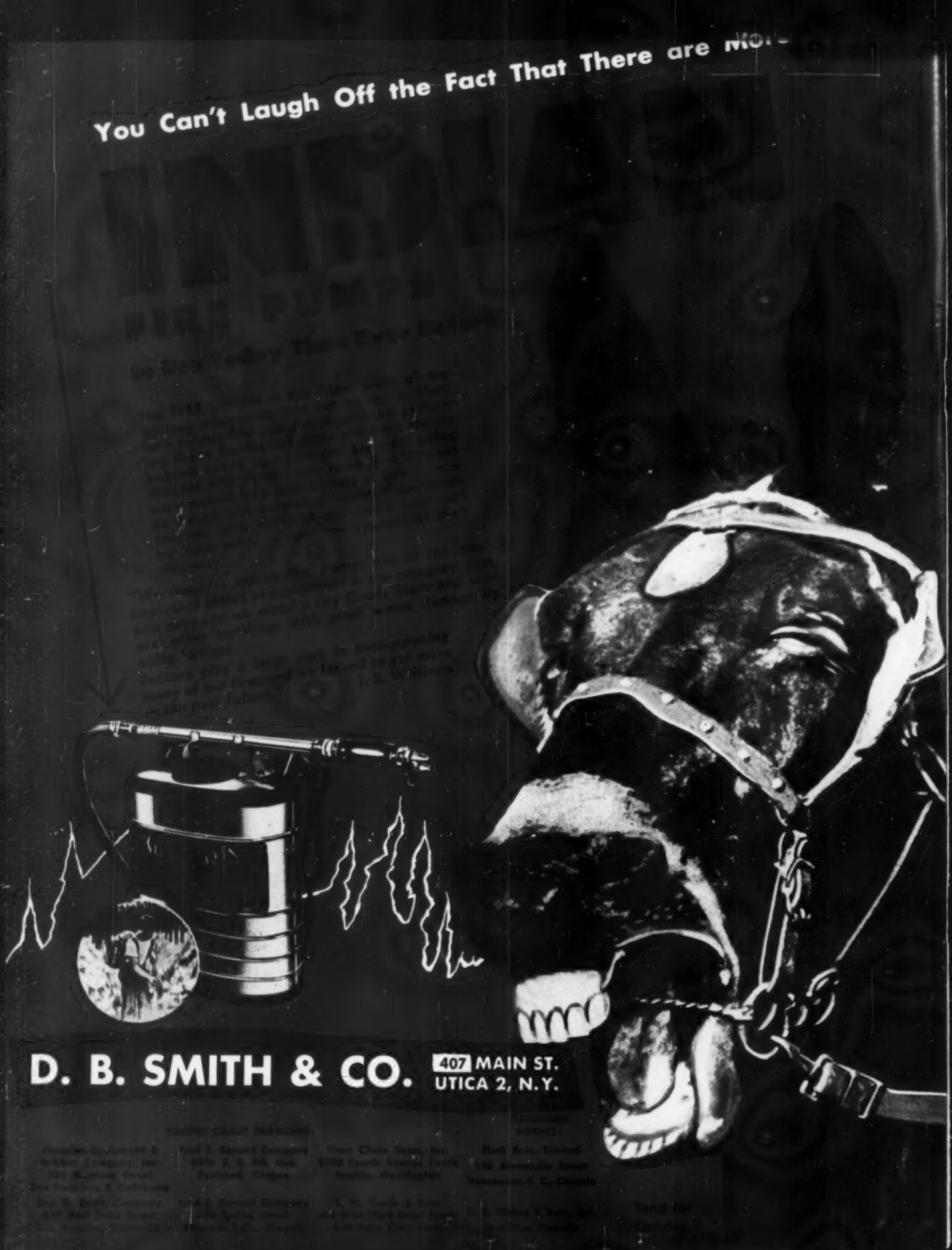

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Photo furnished by the school.

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Journal of Forestry

Official Organ of the Society of American Foresters

Editorial

THE month of June is regarded by poets, graduates, and brides as one of the calendar's most important. Its significance to all three lies in the same basic realization. June is a month of renewal, or of youth and beginnings. It is a time of beauty in the face of nature and a time of optimism and expectancy for men.

This June of 1953 finds a thousand young men leaving the world of college or university, the atmosphere of guided instruction, the stimulation of association with students and teachers, and exposure to the realm of organized intellectual endeavor. These young men have become professional foresters.

They are by no means entirely untried. They have all acquired a basic minimum of training and many of them have already, by the energy and fertility of their own minds, enlarged upon this minimum and interpreted it in accordance with their own individuality and experience. All of them have successfully cleared the first hurdles in becoming foresters. Their future will be determined partly by the quality of the training they have received, partly by those inscrutable fates which influence the destiny of each of us, but to a great and encouraging degree it will be determined by what the young men make of themselves, what they make of the opportunities which come to them, and the misfortunes which befall them.

These young men enter a profession which is regarded as *different*, both by its members and by laymen. In its very departure from the common mold is inherent its unique rewards and its uncommon drawbacks. In 1914 Gifford Pinchot said:

I urge no man to make forestry his profession, but rather to keep away from it if he can. In forestry a man is either altogether at home or very much out of place. Unless he has a compelling love for the forester's life and the forester's work, let him keep out of it.

Almost 40 years later these words ring true. There have been superficial changes in the aspects of both a forester's life and his work. The average practitioner is, in these days, less likely to spend extended periods in wilderness isolation than his predecessor. He is forcefully and continually reminded in his daily activities that he must think of trees in terms of men. He has many new tools with which to work at his job. But these facts simply bear out the foresight and sound philosophy of the founders of the profession in America who pioneered in a time when there were more trees and fewer men. The profession is the same. It has merely grown, and this growth is indicative of its health. The young forester will find himself a member of an established order which is now reaping the rewards of public appreciation, an appreciation which was earned by service to the public. This appreciation is the greatest change.

Another aspect of this growth is demonstrated by the employment opportunities facing a young forester. No longer is forestry almost solely a function of government. No longer is it considered impractical or visionary. Forestry has shown itself to be a hardheaded and practical undertaking, reaping tangible benefits for the stockholder, the client, or the taxpayer. In this fact we are reminded of the universal truth that the measure of the worth of a man or a profession, and in the final analysis the measure of the rewards, is service.

That the young forester will find differences of opinion in the profession as to means and methods, should not disconcert him. So long as such disagreements are openly discussed, their existence is a sign of health and an indication of agreement as to ends. They are, too, an indication that the profession itself is young, though not entirely untried, and in youth there is optimism and a future as promising to contemplate as the fresh green of the campus or the forest in this month of June.

The young foresters are most welcome; to a profession which is a way of life and a way of work and whose rewards are to be fashioned by their own minds and their own hands.—*AM*

'Tis education forms the common mind:
Just as the twig is bent the tree's inclined.
ALEXANDER POPE

Trends in Forestry Education in North America[1]

Myron Krueger[2]
Professor of Forestry, University of California, Berkeley.

THE TITLE of this paper covers a wide geographical area. While I have had the opportunity to view current trends in forestry education in the United States in my capacity as chairman of the Accrediting Committee of the Society of American Foresters, I have not had an equal opportunity to become familiar with recent trends in Canada and Mexico. The discussion which follows is therefore based in part on personal observation and in part on correspondence with the heads of most of the forestry schools in North America. Throughout this paper, for ease of expression, the term, "forestry school," is used to refer to the professional forestry instruction in a given institution. The term does not carry the connotation usually assigned to it in university circles. Finally, this paper is confined to a discussion of forestry education as represented by the baccalaureate degree. Discussion of education leading to the master's degree or the doctorate is worthy of treatment all by itself.

Historical Background

Forestry education on the professional level was initiated on the North American continent as a curriculum in forestry at Cornell University in 1898. The passing years have witnessed a considerable amount of change from this original curriculum. Any professional field presents a certain amount of change with corresponding trends in its educational bases. This has been and is peculiarly true for forestry in North America because of its comparative youth. In discussing these trends with reference to forestry education we are confronted by certain historical developments in North America which tend to cause a difference of opinion, even among professional foresters, as to the definition of forestry. Even though I would define forestry as "the science and art of growing crops of timber in desired form," I am aware of the shortcomings of any definition. I am particularly aware of the narrowness of this definition to those who view the many specialized curricula which have developed in forestry schools, quite largely in the United States, as being encompassed by the term, "forestry." Regardless of possible differences of opinion as to a definition of forestry, it is apparent from the program of this joint meeting of the Canadian Institute of Forestry and the Society of American Foresters that this conference is interested, in reality, in the subject, "Trends in Education Offered in the Forestry Schools of North America." Therefore this paper will discuss this broader subject rather than the somewhat narrower one implied by the assigned title.

White settlement in North America found a continent blessed with a vast acreage and volume of timber. Limited, slow, cumbersome facilities for both transportation and communication were characteristics that carried well beyond the colonial period. Consequently, even after a considerable geographical expansion in population, it was but natural that the magnitude of the timber resource would not be impressive to those living in the areas of early settlement where the first impingement of population on the timber resource would be felt. Many alert, thoughtful citizens of Canada and the United States became particularly concerned about diminishing regional timber supplies during the latter half of the nineteenth century. This situation is evidenced by the discussions at the annual meetings of the American Forestry Congress of the seventies and eighties, one of which was held here in Montreal in 1882. Part of this concern manifested itself in the desire to train professional foresters in America and led eventually to the establishment of the forestry curriculum at Cornell University in 1898. Curricula at Biltmore and Yale followed soon thereafter. During the period, 1903-1914, twenty-one additional schools were established in the United States and three in Canada.

Specialized Curricula

It was inevitable that the early forestry curricula in North America should be based on European prototypes. Perhaps from this standpoint they were established too soon. The situation as regards the forest resource in North America at the turn of the century was in no way comparable to that which applied for any of the European countries. At any rate, there was no demand for professional foresters as managers of forest properties to equal the supply of graduates from these early curricula. The University of Washington was among the first of the North American institutions offering forestry on the professional level to recognize that during the period of liquidating or operating our virgin stands something different from orthodox European forestry education was needed. Without overlooking completely the need for handling our stands in a manner to insure their continuation, there was a greater initial need in forestry education for emphasizing the more economical and orderly harvesting of existing stands. Thus there evolved the first curriculum designed specifically for American conditions—the curriculum in logging engineering. While the impetus for such a curriculum arose in part from the large trees and rough topography characteristic of western timber stands, an effort to make forestry graduates more employable played no insignificant part. At least this reason seems to be the common denominator of all the so-called "specialized" curric-

[1]Paper delivered at the joint meeting S.A.F.-C.I.F., Montreal, Canada, Nov. 1952.

[2]Chairman, Committee on Accrediting, Society of American Foresters.

ula that have evolved, such as range management, wildlife management, forest products, forest business, municipal forestry, and forest recreation. The fact that these specialized curricula were developed so largely within the framework of forestry curricula or schools indicates that the forestry faculties at least were more cognizant of some of the immediate needs of forest land owners and of processors of forest products than were the faculties of other university departments. This has had both beneficial and harmful results to the professional aspects of forestry.

It is significant that specialized curricula were, in most cases, created originally through the addition of specialized courses to standard forestry curricula. The offerings in the five fields: silviculture, forest management, forest economics, utilization, and forest protection were not materially weakened in the earliest specialized curricula. However curricular changes in the direction of specialization begot further specialization. In several curricula, specialization has now reached the point where significant deletions from the five basic fields have been made to make room for specialized subject matter. The resulting curricula are undoubtedly better curricula for the purposes intended than they would be were the full forestry content retained. And, in the main, the results are beneficial to the profession of forestry. But, because these specialized curricula were developed, almost without exception, in forestry schools, many individuals, both within and without the profession, have chosen to designate all of them by the term, "forestry." This has tended to confuse the public as to what forestry is and weakens our claims to professional status.

The Situation Now

As we enter the second half of the twentieth century, we find the forestry schools of North America, as a group, offering a multiplicity of curricula in addition to professional forestry. These specialized curricula have filled and are continuing to fill a real need. Along with this situation in forestry education we find an awareness on the part of many private forest land owners, particularly those with large conversion plants, that their continuance in business can no longer be made possible by moving to other forests regions. Future timber supplies must come, almost completely, from the lands now held by the timberland owners. This situation has made the services of professionally trained foresters a more sought-for commodity than has been the case even in the fairly recent past. The net result is that there is now taking place a serious reconsideration of forestry education and the other educational offerings of all the North American forestry schools.

Thus far this discussion has concerned itself mainly with past trends but with some consideration of the historical reasons for being where we are in forestry education at the present time. The early professional curricula in forestry are cogent witnesses to the fact that the framers of these curricula were mindful of and followed sound basic principles. The curricula embodied the basic attributes which should apply for any professional curriculum: (1) in content of cultural courses to prepare the student for more adequate relationship with his fellow man and thus render his professional accomplishment more effective, (2) in thorough grounding in the sciences basic to professional subject matter, and (3) in course content to cover the required professional training. It is not surprising therefore that current trends as regards professional forestry curricula and curricula in the fields allied to forestry are related in general to an attempt to strengthen all three of the attributes just mentioned.

Trends in Cultural Content of Curricula

The trend toward the strengthening of the cultural course content of all curricula offered by forestry schools is currently quite characteristic of the activities of all professional groups. Condensation of professional subject matter, the basic college, the lower division college, survey courses in the humanities and the sciences, restriction of electives to non-professional courses, and a fifth year to the baccalaureate degree are among the devices that are being used or being considered to make possible a greater cultural content in the professional curricula.

Perhaps no one subject has received more attention than that of getting forestry students to express themselves more effectively in both speaking and writing. This is as it should be because it is doubtful whether there is any more important element in the cultural education of a forester. In the eyes of the general public and not infrequently in the viewpoint of an informed prospective employer the judgment as to professional competence rests on the ability of the forester to express himself in clear, concise language which conforms to ordinary good usage. There is considerable doubt, however, whether instruction on the university level is the most fruitful field for improving this aspect of the forester's education. In the United States, at least, the number of English or speech courses taken in the university frequently bears no relationship to the quality of expression by the student. Ability to express oneself effectively, while capable of improvement throughout life, seems to stem more directly from thorough training on the grade school and secondary school level. In this connection an article appearing in the Toronto Globe and Mail of June 21, 1952 is worthy of mention. The article stated: "After a two-year study, a committee of Toronto teachers has completed an overhaul of the English course taught in Grades 7 to 10." The committee, after "suggesting that English should occupy at least 20 to 25 percent of the classroom time available in the intermediate division," summed up the purpose of English as a course with this statement: "In the study of Eng-

lish we learn to speak with correctness, lucidity and power, to read with understanding and to write with clarity and precision. Above all, we discover one of the most important means of access to life and beauty." Even though the weaknesses in oral and written expression, so apparent among forestry students, may be chargeable in large degree to faulty grade and secondary school preparation, so long as the universities continue to accept these inadequately prepared students, the responsibility rests with forestry faculties to see that these students do not graduate without some effort having been made to correct the deficiencies.

In any discussion of the cultural course content of a professional curriculum one encounters a certain amount of confusion concerning what is meant by a "cultural course." It may well be a term which shifts in meaning from generation to generation, with changing mores and changing levels in scientific knowledge. Perhaps for life in an atomic age subjects such as physics and chemistry should be viewed as cultural courses as well as science courses. At least it has been the experience of most forestry faculties that it is easier to get students to elect courses in the sciences than it is in the humanities. Evidently this is an aspect of the problem which must be taken into consideration in any attempt to strengthen the cultural content of the forestry curriculum.

In order to make education for foresters more fruitfully cultural, it is possible we should place greater dependence on teachers rather than courses. I am sure that many of us here at this meeting have had our cultural outlook enriched by classroom contacts with broadly educated members of forestry faculties during our own undergraduate days. Perhaps in recruiting a faculty the cultural backgrounds and attitudes of a prospective candidate should receive attention equal to that accorded his professional ability and accomplishment.

Trends in Basic Science Content of Curricula

In the field of the sciences basic to forestry curricula or the curricula which have grown out of forestry, the current trend is decidedly toward greater strength. Little fault can be found with this phase of development in forestry education. There is some difference of opinion however, both as between forestry school faculties and the individual members of a given faculty, as to the point at which the forestry faculty should assume responsibility for instruction in the basic sciences. One or two examples will serve to clarify the meaning of this statement. For some time, instruction in silviculture in North America has emphasized its basis in plant physiology and ecology. Currently there is, in addition, a belated but growing emphasis on soils and in a few instances on genetics. Should the basic instruction in these subjects be offered in the departments of botany and soils or should it be offered in the department of forestry, should the basic subject matter in botany and soils appear as separate and distinct courses or should it be merged with the professional course in silviculture? Undoubtedly the same questions arise as to instruction in chemistry in a forest products curriculum. The final decision in any given institution is probably related to the nature of the basic science departments. If these departments view their responsibilities as service departments to the professions with a concern equal to that applying to their responsibilities as instructional and research departments in pure science, forestry and the other professions have much to gain by entrusting instruction to the basic science departments. On the other hand if the instruction takes off, in large measure, to stratospheric heights of abstract theory it is inevitable that responsibility for instruction in the basic sciences will follow a trend more and more toward the professional departments. Whatever may be the future pattern in this aspect of forestry education, professional foresters of North America can find satisfaction in the fact that forestry faculties everywhere are insisting that forestry and the other curricula for which they have accepted responsibility shall be more thoroughly grounded in science.

Trends in Professional Content of Curricula

In discussing the trend in professional subject matter it will be necessary to separate forestry from the other curricula offered by forestry departments. In the curricula in professional forestry the same five fields emphasized in the early curricula are retained, namely: silviculture, forest management, forest economics, utilization, and protection. With greater emphasis upon better scientific preparation for the professional courses, there is a trend toward condensation of professional subject matter with a corresponding reduction in the number of professional courses Part of the condensation arises out of the elimination of some of the vocational material characteristic of many forestry curricula in the second and third decades of forestry instruction.

The most marked alteration of professional subject matter has occurred in the course in forest mensuration. Beginning some twenty-five years ago, the introduction of statistical measures, particularly the theory of sampling, has brought about an entirely different approach to both volume and growth determination. More recently, photogrammetry is bringing about still further change. Currently the character of the courses in forest economics and forest fire protection is experiencing the greatest change. In forest economics the change reflects the efforts of economists, largely during the last twenty-five years, to relate the science of economics to a dynamic rather than a static society. The change in fire protection, while not having the universal aspects of a trend, is coming about as we obtain more knowledge concerning fire behavior and the basic determinants of that behavior. A change somewhat less striking but none-

theless significant is that in the utilization courses designed for professional foresters. Here the trend seems to be away from emphasis on methods and equipment used in logging and the processing of forest products, as such, and toward greater emphasis on the relation of these factors to the growing of crops of timber.

There is apparent an undercurrent of feeling among many professional foresters and employers of foresters that our recent forestry graduates have not integrated adequately the scientific and professional subject matter comprising their professional training. Too frequently the individual courses exist as parts of a jigsaw puzzle which the student has never fitted together into a completed picture. As a consequence the graduating forester lacks the stamp and bearing of a professional man. The efforts being made to bring about a desirable degree of integration can hardly be characterized as a trend. Some schools have never given up the original mechanism of requiring the writing of a forest management plan for an actual or theoretical tract. Other schools are using or are contemplating the use of comprehensive examinations. There is some talk of a fifth year to be devoted quite largely to making the student more familiar with professional forestry practice. However, so far, there is not emerging a pattern of procedure which is as characteristic of the education of a forester as is the internship in the education of a medical practitioner. Furthermore it is doubtful whether a trend or pattern will or can emerge until a much larger percentage of the profession views forestry as something quite distinct and not inclusive of such widely divergent fields as, for example, the highly specialized chemical phases of forest products, and range management.

Future Trends

As to the specialized curricula, it is abundantly evident that the trend in professional content is in the direction of still further specialization. This is particularly true of the field of forest products. Pulp and paper technology has constituted a distinct curriculum for many years. The field of wood technology is being broken down into separate curricula in the physical and chemical phases. The specialization appears likely to continue. A somewhat less intensive specialization is occurring in range management and wildlife management. However, with the need for grounding the student in both the animal and plant sciences basic to each of these two fields, specialization is of necessity resulting in the deletion of many of the professional forestry courses formerly a part of both curricula. Due to the growing tendency toward the licensing of engineers, with its usual requirement of graduation from a college of engineering, there is likely to be little further extension of specialization in the field of logging engineering.

With the high degree of specialization which has developed and is developing in some of the fields, we may look for some transferring of specialized curricula from the jurisdiction of forestry schools to the jurisdiction of departments of industrial or chemical engineering, departments of zoology, departments of agronomy, and departments of animal husbandry. Some of the specialized curricula may insist upon separate departmental status. Whatever may be the development of specialized curricula with respect to either degree of specialization or status within the university organization, the trend is not one that should cause foresters too much worry. On the contrary, at least in the field of forest products, the continuing intensification of specialization should redound to the ultimate good of forestry, unless carried to the point of such finely divided subject matter that we have several curricula, each approaching the vocational in character.

The trends in forestry education and the trends in education offered by the forestry schools of North America are of tremendous interest to all foresters. Forestry in North America is charged with the dynamics of change. Professional education must keep pace with this change. The forestry profession and our sister professions which have evolved from specialized curricula will wither on the vine if we do not have a continuous flow of well trained men coming into each of the professions. We must develop curricula that will meet their several needs.

As stated in the preamble, this paper has discussed the broad aspects of all curricula offered by the forestry schools of North America. I would like to close with a few remarks concerning the curricula lying strictly within the field of what I consider to be professional forestry. While the current trends are in the direction of strength, we still have a considerable distance to go in developing curricula which will turn out graduates capable of making forest land produce up to its full potential of timber in desired form. The public has a right to expect us to be experts in this field. To fail in this objective, no matter how great our accomplishments may be in other directions, will be a serious indictment of the profession. We need to develop curricula that will attract and challenge the best young minds of the North American nations to a much greater extent than has been the case in the past. So far those with the better academic accomplishment have gone largely into research. We have a desperate need for keen minds and skills in the practice of forestry, in making forestry work in the woods.

The development of better forestry curricula constitutes a problem that is not exclusively the province of those members of the profession engaged in education. It is a problem that calls for the earnest attention of every member of the profession. Our profession is concerned with a natural resource. Through concerted study and action we can arrive at much stronger professional training. The result of our efforts can be that of making our profession one of the most respected in the world. The trend is in that direction. We need to see to it that the trend continues.

Factors Affecting Successful Job Performance by the Young Forester[1]

W. F. McCulloch
School of Forestry, Oregon State College, Corvallis.

PROBABLY the chief factor affecting the young forester's job performance is the forestry school. True, there are other important influences, chiefly the high school, the home, and the employer; but the forestry school bears upon all of these to some extent, as it does directly upon the student. His personal problems and interests are also very real factors influencing his work. An alert personnel program in the school can identify these inner factors, and bend them to constructive use. Similarly the school can modify the outside influences that affect good job performance. The various factors are considered here on the basis of experience at the School of Forestry, Oregon State College.

High School Factors

Colleges are inclined to say that secondary education today is poor. It is true that college entrance examinations show an increasing number of high school graduates to be inept in English and mathematics; and some time is lost in repairing these deficiencies. However, the situation can be improved if forestry schools will work more directly with the high schools. There is no standardization of college entrance requirements, but even so, most high school programs are sufficiently flexible to permit arrangement of courses toward a definite professional objective, if the high school knows the prerequisites for that objective. It is not unusual to find a hopeful forestry freshman expert in drama, but deficient in algebra. To prevent this mischance, the high schools of the state (and neighboring junior colleges) should be circularized concerning the program which best prepares students for forestry.

There is a considerable lack of forestry information at the high school level for the reason that in the total occupational picture nationally, professional forestry is not significant. Hence some high school teachers have only vague, and often incorrect ideas of forestry possibilities. In one instance, when seniors all had a choice of jobs, when employers were clamoring for more men and paying newly graduated foresters as much as $400 a month, the principal of a high school one hundred miles away from a forestry school was telling his boys to stay out of forestry because there was no hope of employment in that field. Probably the forestry school was at fault. A student cannot be expected to be an interested or a competent worker when he and his high school advisors lack information on professional requirements and career possibilities.

Home Factors

The freshman's sudden release from home supervision may result in all disciplines being thrown overboard, including his attitude toward work. The student can fail both on the campus and on the job if the school does not provide professional guidance to complement his previous home influence. The potential forester starting college has made a break with his home surroundings. He is now in a new environment, with a fresh, and it is hoped an inspired, start toward a career. He is malleable. The opportunity to work him into the shape of a good man is tremendous, a challenge to every forestry educator.

The forestry school should hold the student to strict standards of performance for his professional good. It is futile to carry through to graduation a young man who cannot be recommended for employment. Illustrating this point is a freshman whose employer reported: "The boy is quite intelligent, but his parents have carried him along and he has never had to work. He does not know the meaning of a day's work. We would not care to hire him next year unless the manpower situation is extremely acute."

The circumstances were discussed with the employer and the student. Because a good relationship existed between school and employer the student was given another chance, based on the school promise to work on him before the next field season. The student was shown that he had already alienated one important employer. The requirements of forestry careers, good workmanship, and the relationship of seasonal to permanent employment were emphasized. The student proved receptive, and careful counseling enabled him to rehabilitate himself. In effect, the school overcame a home deficiency.

In addition to such remedial work directly with the student, forestry schools can do some preventive work by informing parents of the demanding professional standards which the boy must meet if he is to succeed; by declining home entreaties to have him tutored when his work slips a little (this action often seems to saw another leg out from under the student); and by educating them to the realities of the profession.

In addition to parental factors, the married forester's job performance is greatly influenced by his wife. Emotional upsets often occur when a city girl suddenly finds herself stuck in a shack thirty miles from the nearest town. Job failure may be due to failure of the man to explain the facts of forestry to his wife, to prepare her for living conditions which may be temporarily rigorous.

Inevitably domestic discord or divorce is accompanied by poor job performance. To prevent it, the school orientation program should help the man to give his wife a fair understanding of the forester's responsibilities and requirements,

[1]Paper presented at the joint meeting, S.A.F.-C.I.F., Montreal, Canada, Nov. 1952.

particularly in the early years of his career.

Forestry School Factors

A forestry school exists to serve forestry; and this can be accomplished best through the persistently good performance of its graduates. Hence, the responsibility of the school in influencing the professional outlook of its men is endless. The word "men" is used advisedly. A first premise in developing satisfactory work standards is to have the young forester know that the school expects the conduct of a professional man, not that of a boy. For this reason personal development must be emphasized. The school must try to unleash within the man those abilities which will lead to the greatest self-realization in his profession. Otherwise his job performance potentialities cannot be achieved.

A second premise is the development of citizenship. This means an assumption of responsibility for the common good, and a willingness to work with others in achieving it. This definition also applies on the job. Most forestry employers stress the importance of cooperation on the job and with the public, as well as with other employees. Thus, being a good citizen at work as well as in the community is a basic factor influencing job performance. The school should encourage this kind of citizenship.

A third premise held by some educators is that the greater the scholastic success, the greater the success on the job. This will be true only if the man's academic development parallels his personal development. Academic attainment alone does not measure a man, because it implies a concern mostly with techniques, excluding consideration of the man who uses those techniques. Forestry education can exert an adverse influence on the job performance of young foresters if it is too academic, too detached from reality. The school must make an effort to surround the student in a professional, as well as an academic atmosphere. He should not be taught just forestry techniques, but forestry as an economic process, forestry as a way of life, forestry as a responsibility in resource stewardship.

Foresters are expected to be able to do as well as to think. Professional courses taught with a liberal viewpoint will enable them to do both. To encourage successful job performance, the school should slant its processes in a realistically professional direction, but without chaining the mind or limiting the vision.

Additional efforts toward improvement of job performance should include:

1. Six months of successful work on the job as a prerequisite to graduation.

2. Required courses in orientation to the profession, personal development, and personnel management. Granted no course is a cure-all, but more can be accomplished with such honest effort than without.

3. An employment conference for all new students prior to the summer work season, emphasizing obligations to the employer and the profession.

4. Employer work reports on student performance.

5. An annual rating of each student in the school by the forestry staff; and a separation of the men from the boys based on the rating.

6. School recommendations based on practical performance as well as academic ability.

7. A staff with contagious enthusiasm for forestry.

Employer Factors

Any analysis of work performance will show that the young forester on his first job is greatly influenced by his immediate superior. Increasingly in late years that superior may be a college man himself, and as such, sympathetic to the beginner. However, the boss might be a practical woodsman, antagonistic to a potential competitor, and intolerant of his inability to do work which is mere routine to the old-timer. Forestry schools should educate professional foresters so that they will be interested in the young undergraduate and capable of training him on the job to make the best use of his abilities. This could be done in the personnel management course mentioned previously. Second, they should maintain a sufficiently good basis with employers to ask that the old-timers do not make it unreasonably tough on the impressionable young forester. Nothing makes a poor man poorer as quickly as a poor boss.

Another contribution to better workmanship is a program of job training operated jointly by school and employer. In one case a working agreement has been established with several employers who take a few men each summer on seasonal jobs with the purpose of choosing the best man for eventual permanent employment. The students know that one or two of the top men each summer will be added to the permanent staff and this leads to good work by the entire crew.

The professional school must be interested in employers' problems as well as in students' problems. Only then can it serve both capably. Wherever possible, staff members should spend some time in the field, inspecting the work of graduates and seasonal men. In so doing they can keep their course work fresh by learning operating conditions and new developments in woods or plants. This is also an opportunity to extend job contacts for the school, to keep it abreast of employment conditions and employer needs. Where employers know that the school is not only concerned, but competent in placement, they are likely to provide employment conditions which will give an incentive for successful job performance by the young forester.

But the school must be both interested and competent in placement—which brings the responsibility right back where it belongs, to the forestry school.

Continuous Inventory Management and Growth Studies

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The investigation and development of information on timber stands, their composition, treatment, growth, and reaction to cutting is as important to the work of the timber manager as to the researcher. This paper discusses the objectives of timber management control and the techniques used, including a punch card system, which enable the timber manager to bring these objectives within his reach.

TIMBER GROWTH FIGURES are essential to the timber operator with a permanent operation. The volume of growth is important to the determination of the cutting budget and the wood produced by each tree will be harvest material for future cuts. Thus, of first importance is the accurate determination of the amount of growth. This determination should be a working part of every timber management scheme.

The present status of timber management is such that growth data is a nebulous matter to many foresters and timber managers. It is often obtained by mechanical rule of thumb predictions based upon increment borings of past growth. In central hardwood stands with their great variations of species and composition, few people have a good common sense estimate of what growth might be in a given stand or what it should be under given conditions of management. There has been so much emphasis placed upon finding what a given stand is growing (say 250 board feet per acre per year) that this type of growth calculation has come to be the ideal, the end result of growth investigations. In reality, it should be regarded as the starting point.

Continuous Inventory

Timber growth, cutting, and the development of the stand are a continuous process. It is, therefore, quite plausible that in working with the stand, continuous records be kept.

The continuous inventory idea was born in France and put into use by the Swiss starting in 1890 (*3*). The Swiss very aptly call it the "method of control." Continuous inventory provides a continuing determination of actual growth. Growth estimates, while important in planning the regulation of the forest, need not be extremely accurate, especially in the initial phases of management. However, continuous inventory, while providing growth data, also performs a function of even greater importance—it provides a means of systematically controlling the stand and shows at all times the progress of management.

The idea of management control through recurrent inventories is not new to this country. Both Meyer (*4*) and Wahlenberg (*7*) have presented the details of the system. C. B. Stott has been using it in his work with the Division of State and Private Forestry in Region 9 of the Forest Service. He has explained the business aspects in a previous paper (*6*).

Many writings (Stott's excepted) on continuous inventory have dealt with mass data studies of the total stand. This is not enough. Recurrent inventories of the total stand provide only a minimum of essential information on what is actually taking place in the forest. It is not until we study the basic unit of the stand—the individual tree itself—that we can begin to develop a good understanding of the forest as nature has built it.

The Individual Tree in Forest Management

It is the treatment of the individual tree and its environment that ultimately determines the development and progress of the stand as a whole. A knowledge of the individual tree, its characteristics related to growth, value, and quality should replace artificial guides to stocking, cutting, and other timber management considerations.

It is not enough to determine that growth averages 300 board feet per acre per year for a given tract. We must analyze the stand by breaking it down into its individual components and seeing what each is contributing. Thus we can determine which are carrying the load and which are "dragging their feet" and how each react to either natural or man-made changes. This is one of our greatest management needs. G. A. Pearson (*5*) states that "individual tree records have furnished information on growth trends, mortality, damages, and competition, which the customary practice of mass averaging would miss completely" and that "estimates of future yield should envision the performance of the best tree types under intensive management instead of mass averages in untended forests."

Management on the ground by the man who marks the timber is a matter of individual tree considerations. Holsoe (*2*) states that "in order to conduct intensive silvicultural management (note he says "management" rather than research) it is necessary to have an intimate knowledge of the growth and reactions of the individual trees." He also points out that the practicing forester is quite concerned with "developing through some form of cutting, the individual trees that form the forest stand."

Thus is developed the concept of individual tree silviculture. It should be our purpose to consider the individual tree, its relation to the stand as a whole, and its development throughout its life in the stand.

An Experimental Program

The Ohio Agricultural Experiment Station has 33 experimental forests of farmwoods size. Their objectives were designed to specifically fit the concepts of continuous inventory and individual tree sil-

viculture as outlined above. Each woodland is managed as a unit and management data are obtained from permanently established 1/5-acre cruise plots on which each tree is individually numbered. Recurrent measurements of these plots at 5-year intervals provide continuous inventory growth and management data for individual trees. Plots total 1,378 in number, with approximately 25,000 individually numbered trees. Our objective cannot be to evaluate all 25,000 trees as individuals, but rather, lump them together into what might be termed "minute averages" as opposed to Pearson's term "mass averages." The data on specific individual trees is available for study as deemed necessary to supplement the averages.

In order to meet the requirement that the stand must be broken down into its individual components, several classifications are used. In addition to the common components of species and diameter class, the trees on each permanent plot are assigned a vigor grade (*1*), a quality grade (*1*), and a cull grade (*8*). Each plot is classified as to aspect, location on topography (a site classification), and timber type. Some trees, of course, are marked, cut, or are lost through mortality.

The conduct of the field work requires close attention to details and an insight into the philosophies of continuous inventory and individual tree silviculture and growth determinations. Procedures must be determined in advance and major changes cannot be countenanced. The calculation of extremely accurate absolute figures is not as important as maintaining relative accuracy. Measurements, tree grades, and computation procedures must maintain a constant level of relativity or the growth data is useless. The difference of tree volumes between measurements must represent actual growth rather than differences in estimation of height or cull or a different volume table or computation procedure.

Field data are collected on the following form:

Tract *#6* *McNish-Geauga* *Co.* Plot No. *15* Date *Established 1/1/46*
Topography *B-1* Aspect *N* Tallyman *W.E.A.*
Timber type *Beech Maple* Remarks Estimator *J.W.M.*

Tree No.	Species	First Record Date 1/1/46 DBH	Tree Class	Used Length	Cull Class	Cut	Second Record Date 1/1/51 DBH	Tree Class	Used Length	Cull Class	Cut
1	Y. poplar	22.4	1-A	54	2		24.6	1-A		2	
2	H. maple	16.7	2-B	40	3		17.5	2-B		3	
3	Beech	26.6	2-B	48	3		27.5	2-B		3	
4	Beech	24.3	3-C	40	5	X	has been cut				
5	H. maple	28.2	1-C	48	4		28.9	1-C		4	

When this system was organized no provision was made for a special system of calculation. Individual trees were transferred from the field plot book to a standard computing sheet by dot tally. It soon became apparent that the analysis of the stand and its growth by all the proposed classifications was to become an unwieldy operation. The sorting of data from the plot book to the different tally sheets (as many as 1,000 trees per woods) proved to be tedious and time-consuming with much "leafing-through" a sizeable sheaf of papers. Full use of the data collected in the field was impossible. Results still tended toward the mass average and many of the merits of the system were lost.

After it became evident that the mechanical sorting—shifting individual trees from field records to tabulations by species, diameter, vigor, quality, and combinations thereof—was the important operation, then a search for a suitable tool or method led to a punch card system, McBee Keysort.

The idea for using the McBee system came from observation of its use in the armed forces. During the last war McBee cards were used for personnel records. An important feature was the ease with which one or two men with a required training or background could be selected from a large group by sorting cards according to the classifications desired.

The McBee Keysort System

McBee Keysort is a manually operated punch card sorting system. With one card for each tree, the cards are also a permanent record and filing system, and provide the basis for standardized calculation.

The value of the system as a sorting device is its important feature for this work. It provides flexibility and assures complete use of the field data. Once the individual tree cards are prepared, they can easily be sorted into any number of categories and the data from the cards totalled to give the answers.

Figure 1 is a sample McBee individual card. The margin of the card contains the sorting feature. Each breakdown of d.b.h., species, etc., is represented by a hole (or set of holes for coded classifications). To sort out 16-inch trees a stylus or sorting needle is inserted through the "16" hole in a packet of 50 to 100 cards. When the cards are fanned and shaken, as seen in Figure 2, all 16-inch cards (which have had the margin of the hole punched out) will fall from the packet. The data from the cards obtained by this "sort" is totalled by longhand or adding machine and entered on a separate ledger sheet or table.

There is, of course, no standard design for a card. Each must be designed for the specific purpose which it is to serve. The planning of the card is the most important feature in developing the system. This card was designed with the following objectives in mind:

I. The interior (adapted from a similar card developed by C. B. Stott).[1]

   A. To provide a continuous long term record of each tree.

   B. For standardized computation of the data, computa-

[1]Division of State and Private Forestry, North Central Region, U. S. Forest Service.

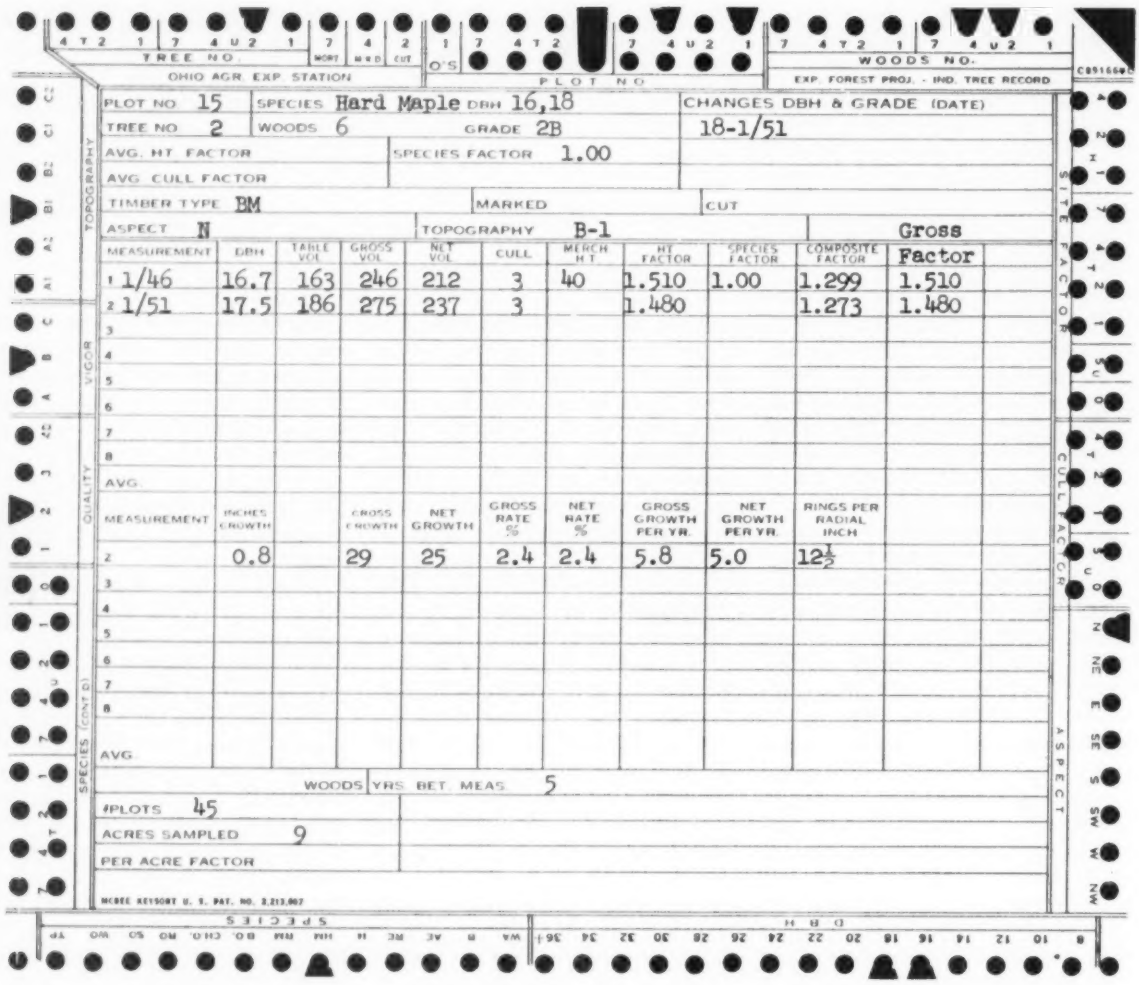
TREE NO.
OHIO AGR. EXP. STATION
PLOT NO
WOODS NO.
EXP. FOREST PROJ. - IND. TREE RECORD
PLOT NO 15
SPECIES Hard Maple DBH 16,18
CHANGES DBH & GRADE (DATE)
TREE NO. 2
WOODS 6
GRADE 2B
18-1/51
AVG. HT. FACTOR
SPECIES FACTOR 1.00
AVG. CULL FACTOR
TIMBER TYPE BM
MARKED
CUT
ASPECT N
TOPOGRAPHY B-1
Gross
MEASUREMENT | DBH | TABLE VOL | GROSS VOL | NET VOL | CULL | MERCH HT | HT FACTOR | SPECIES FACTOR | COMPOSITE FACTOR | Factor
1 1/46 | 16.7 | 163 | 246 | 212 | 3 | 40 | 1.510 | 1.00 | 1.299 | 1.510
2 1/51 | 17.5 | 186 | 275 | 237 | 3 | | 1.480 | | 1.273 | 1.480
AVG.
MEASUREMENT | INCHES GROWTH | GROSS GROWTH | NET GROWTH | GROSS RATE % | NET RATE % | GROSS GROWTH PER YR. | NET GROWTH PER YR. | RINGS PER RADIAL INCH
2 | 0.8 | 29 | 25 | 2.4 | 2.4 | 5.8 | 5.0 | 12½
AVG.
WOODS YRS. BET. MEAS. 5
#PLOTS 45
ACRES SAMPLED 9
PER ACRE FACTOR
McBEE KEYSORT U. S. PAT. NO. 2,213,867
TOPOGRAPHY
VIGOR
QUALITY
SPECIES (CONT'D)
SITE FACTOR
CULL FACTOR
ASPECT
SPECIES
DBH

FIG. 1.—Sample McBee card for continuous individual tree records.

tion to take place on the card.

II. The margin.

A. For sorting individual trees into various categories for stand analysis (including construction of stand tables) and calculation of growth for each component of the stand as follows:

1. Species
2. D.b.h.
3. Vigor (A, B, C)
4. Quality (I, II, III)
5. Cull class (1 thru 5)
6. Marked trees
7. Cut trees
8. Mortality

B. The sorting of individual plots for comparison of detailed stand structure and growth by plot groups as follows:

1. Aspect
2. Topography
3. Site
4. Timber type (There is no provision for a direct sort. Plots have to be pulled out by plot number).
5. The sorting of cards by tree number, plot number, and woods number for the purpose of picking out individual trees, plots, or woods for study, and for arranging cards in proper order for entry of new data.

Advantages of the System

1. The cards provide a continuous permanent record, easily filed and easily read. The story concerning any one tree is readily perceptible. One card is good for 8 measurements (35 years if interval is 5 years).
2. It is relatively inexpensive.
3. It is available for immediate use in the office, requiring no outside machine work. The operator has the cards available to try any type of "sort" which he may desire.
4. Computation is standardized and simplified. Duplication of calculation for various analyses is avoided.
5. Working with the cards gives the computer a very satisfying insight into the way individual

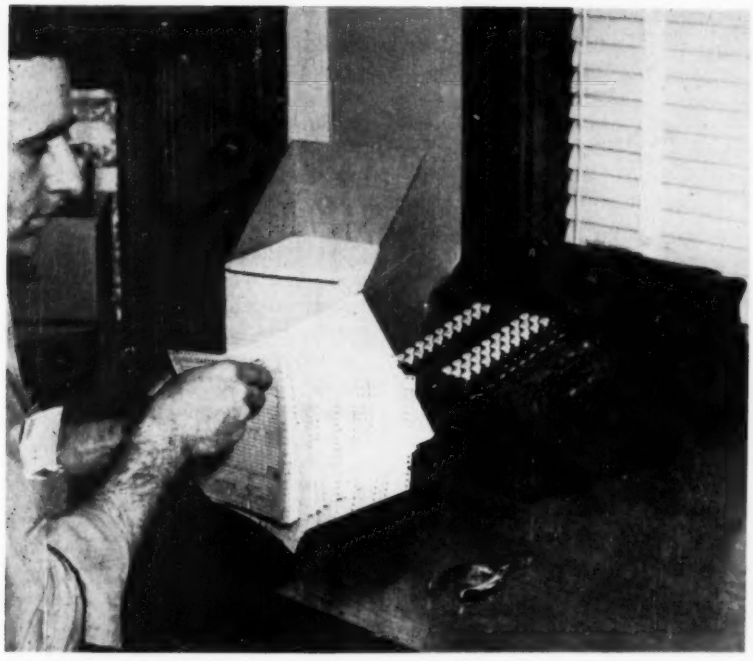

FIG. 2.—The sorting operation with McBee cards.

trees grow and the great differences between individual trees.

6. A high degree of flexibility is assured if the card is designed properly. The back of this card is blank, leaving room for the addition of more data and the development of more intensive work.
7. Minute details of individual tree growth are possible.
8. Many steps in the process can be handled by non-technical personnel. This is not possible when analyses are made by conventional long-hand methods where the details develop into an intricate operation.

Disadvantages of the System

1. The preparation and computation of individual cards is done by hand and with an electric calculator, a much slower process than I.B.M. or other automatic punch card devices.
2. Data is totalled from individual cards (after they are sorted by hand, a slower process than I.B.M. or other automatic calculating punch card devices.

General

The system is therefore, more suitable for the smaller scale job or intensive study where analysis and sorting of data are more important than the totalling of overall cruise and growth figures. Although we have 25,000 or more cards, we do not work with them all at once, but with 1,000 or less from a given experimental woodland.

Entering data and computing the cards is work. However, the use of the system has resulted in a major simplification of the procedure formerly used and opens a reservoir of hitherto unobtainable information all present in the basic field data, but which couldn't be properly analyzed before.

Results

Early results are gratifying. Several experimental forests have been remeasured after 5 years of growth and computations are underway.

Table 1 portrays a comparison (based upon 9 acres of sample) of stand first inventory, cut, mortality, growth, and stand second inventory for one farmwoods.

It should be explained that this is a sugarbush. Hard maple is not cut as long as trees are producing sap—hence the light cut and heavy mortality for this species.

The annual growth per acre (excluding ingrowth) is 157 bd. ft. (2.4 percent simple interest annually). This is an average of 5 bd. ft. per tree (for the 29 trees per acre still left from the original stand.

Further analysis of growth per tree shows that 13 percent of the trees grew 10 or more bd. ft., while 33 percent grew from 5 to 9 bd. ft., and 54 percent of the trees grew less than 5 bd. ft. per year. A check of the cards reveals that some of the faster growing individuals in this woods grew as follows:

Species	Diam. class inches	Diam. growth 5 yrs. inches	Bd. Ft. growth per year	Simple annual interest percent
Yellow poplar	14	2.5	22.8	14.2
Cucumber magnolia	24	1.6	22.8	3.2
Red maple	14	2.2	17.8	12.0
Beech	16	1.8	16.8	6.7
Red maple	14	2.4	15.4	14.4

The importance of individual tree considerations is quite evident. Many of the trees in this stand are "dragging their feet." There is plenty of room for the develop-

TABLE 1.—STAND INVENTORIES MCNISH EXPERIMENTAL WOODS FOR 5 YEAR PERIOD (1946 Through 1950 Growing Seasons)

Species	Original stand per acre No. trees[2]	Original stand per acre Vol.	Stand removed bd. ft. per acre Cut	Stand removed bd. ft. per acre Mortality	Original stand now present No. trees	Original stand now present Vol.	Per-acre per year Growth	Per-acre per year Ingrowth	Stand per acre 2nd Inventory No. trees	Stand per acre 2nd Inventory Vol.
H. maple	9.8	2234	20	113	9.1	2102	40.0	7.6	9.9	2340
Red maple	5.6	1361	—	—	5.6	1361	32.7	4.4	5.9	1546
Y. poplar	4.7	1438	231	55	3.9	1152	32.6	5.8	4.3	1344
Hickory	3.8	630	45	6	3.6	579	10.8	2.4	3.8	645
Beech	2.7	614	199	—	2.0	415	10.2	1.2	2.1	472
Cucumber	1.7	374	56	—	1.4	318	8.6	3.4	1.8	378
Red oak	1.2	893	651	—	0.7	242	7.2	2.4	0.9	290
White ash	0.6	35	—	—	0.6	35	2.4	12.6	1.4	110
Am. elm	1.1	243	114	50	0.7	79	2.6	6.0	1.2	122
Bl. cherry	1.0	271	94	—	0.7	177	4.4	1.6	0.9	207
All others	2.2	343	165	13	1.3	165	5.4	1.4	1.4	201
Total	34.4	8436	1575	237	29.6	6625	156.9	48.8	33.6	7655

[2]11.0 inches d.b.h. and over.

TABLE 2.—RED MAPLE — MCNISH EXPERIMENTAL FOREST
Number of trees measured and annual growth per tree (1946 through 1950 growing seasons)

	Vigor class								
	A		B		C		Total stand		
D.b.h.	No. trees	Bd. ft per tree	No. trees	Bd. ft. per tree	No. trees	Bd. ft. per tree	No. trees	Bd. ft. per tree	Growth percent
12	2	8.0	3	3.8	3	2.3	8	4.3	7.1
14	5	10.1	3	2.8	3	2.5	11	6.0	4.6
16	3	8.9	1	5.4	2	3.1	6	6.4	3.7
18	—	—	2	6.8	1	1.8	3	5.1	2.4
20	2	12.9	—	—	4	4.5	6	7.3	2.5
22	3	4.4	2	11.1	1	1.4	6	6.1	1.5
24	4	7.3	—	—	1	8.0	5	7.5	1.5
26	3	4.9	—	—	—	—	3	4.9	1.0
28	—	—	—	—	—	—	—	—	—
30	—	—	—	—	—	—	—	—	—
32	—	—	1	1.4	—	—	1	1.4	0.3
Total	22	—	12	—	15	—	49	—	—
Av. growth per year	—	8.0	—	5.2	—	3.3	—	5.9	2.4

ment of a stand with a higher percentage of faster growing trees. The possibilities in timber growth are quite large as evidenced by the excellent growth of certain trees.

Vigor grades, based upon visible tree characteristics have proven to be excellent indicators of growth potential for the individual tree. The stand under discussion has an average of 13.3 A (good vigor), 14.1 B (medium vigor), and 6.2 C (poor vigor) trees per acre, plus 2.6 culls per acre. Table 2 presents annual growth per tree by d.b.h. and vigor for one species—giving further insight into the tree growth pattern.

This type of breakdown is perhaps one of the most valuable analyses that can be made. With a knowledge of the structure and composition of his stands, the forest manager can use these data as an invaluable guide to the development of his cutting techniques.

The ultimate in forest management can probably be said to be a stand composed almost entirely of efficient producers. The forest manager's job is to work toward the development of such a stand. The analyses presented here can show him the possibilities existant in such an endeavor and the line of attack he can pursue.

Summary

Continuous inventory and individual tree silviculture should be an integral part of timber management work.

Sound timber management investigations are concerned with the individuals of which a stand is composed and their continuing behavior over a period of years. This can be accomplished with permanently established cruise plots on which trees are individually numbered and classified.

A mechanical sorting device is necessary to develop the data to the fullest extent. The McBee Keysort system has been quite satisfactory in its use on small experimental forests for intensive analysis of continuous inventory data.

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Post-War Forestry in Western Europe[1]
Part II.—Germany, Switzerland, and France

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ONE CANNOT LEARN enough within a few months to speak with authority on the general state of European silviculture or forest management. The language barrier alone is quite a drawback. There are relatively few French foresters who speak anything but French, or German foresters who speak anything but their native tongue; and though the Swiss foresters usually speak both German and French or French and Italian, few speak English. This discussion, therefore, is not designed to cover the broad picture of forestry, but rather to give the particulars on a dozen or so topics of special interest within the fields of silviculture and forest management. Developments in the field of forest mensuration are avoided as they are covered in a book.[2]

American Introductions on the Continent

In Germany, Switzerland, and France, quite the opposite from Britain, the emphasis is upon the use of native tree species. This is particularly true in Switzerland, where the natural methods of silviculture and management are supreme. Yet, even in Switzerland, there is interest in exotics. The Swiss prefer to work with their native tree species, but they do have an economic need for lightweight woods not produced by their own trees. For this reason, white pine continues to be grown despite the depredations of the blister rust, and the acreage of poplar is being increased whenever possible.

Throughout Germany, there is a great deal of interest in Douglas-fir. In the Zwiesel West district of the Bayerisher Wald near the Czech border, there is a beautiful stand of Douglas-fir more than 160 feet high and with diameters of more than 4 feet. In the middle of this stand, one can easily imagine himself somewhere in the Cascades or the Sierras. High quality established Douglas-fir stands are reserved for seed production purposes. An example is a fine 48-year-old stand at Phillipsburg in the Rhine Valley in upper Baden. Here, the state forest officers would like to see 10 percent of the valley forests converted to Douglas-fir, and the planting program for the current year is one million trees of this species. Again, in the Walkenried District in the southern Harz Mountains in Niedersachsen, Douglas-fir makes fifty percent more growth than spruce on the same sites and is being planted increasingly. Still another example of the fine growth of Douglas-fir in Germany is afforded by a small stand on the school forest at Hann-Münden where the largest of the 66-year-old trees is 110 feet high and

FIG. 1.—A beech stand in an early stage of regeneration by the Swiss Shelterwood system. School forest, Federal Institute of Technology, Zurich, Switzerland.

[1] *Part I.—England and Scotland,* appeared in Vol. 51, No. 3, JOURNAL OF FORESTRY. Scientific Series Paper No. 2706, Minn. Agric. Expt. Sta., University Farm St. Paul.

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FIG. 2.—Pure spruce forest on hardwood site. An example of the conditions resulting in poor growth in the second or third rotation. School forest, Federal Institute of Technology, Zurich, Switzerland.

21 inches in diameter.

In most cases, exotic species such as Douglas-fir are reproduced by planting. In at least one instance, however, excellent natural regeneration has been obtained. In the Taunus (Oberreifenberg, Hessen), Douglas-fir was planted in 1914 following windthrow of beech the previous year. In 1936, the very dense stand was damaged by snow and a clearing of perhaps an acre had to be made in it. Since 1939, this spot has come in heavily to natural regeneration of Douglas-fir despite previous planting of various European hardwoods.

The other American species that has come into prominence on continental Europe is the eastern red oak. Both in Germany and in France, it is grown on hardwood sites too poor (either too dry or too wet) for the native white oaks. Actually, it grows faster than the native oaks on all sites, but the native oaks are preferred wherever possible because of their greater value. Native oak is the principal tree used in the furniture industry, and also is important for veneers. Red oak has become a common tree in the German forests and is conspicuous in the present-day forest nurseries.

American poplars are not widely planted as yet, but are the subject of a good deal of interest. One beautiful stand of the so-called "Canada" poplar, an unidentified variety of American cottonwood, occurs on the overflow lands of the Rhine River just north of Karlsruhe. Now 57 years old, the trees reach a height of 145 feet and diameters in excess of three feet. Although the poplar made up only one-third of the original planting (two intervening rows of every three being European ash, elm, and hornbeam), the growth of the poplars alone exceed that of practically any other German record.

Whereas Germany has good softwood or mixed wood stands throughout the country, France has relatively little in the way of conifers at the lower elevations. Since European conifers cannot be grown profitably on these sites, and since there is a great need in France for more conifers, the present tendency is to plant Douglas-fir and *Abies grandis* in increasing amounts. All in all, exotics play an important role despite the great emphasis placed upon native vegetation in Switzerland, Germany, and France.

Larch in Germany

At the present time, European larch is an important though secondary species throughout Germany. One famous larch locality is Schlitz, in Hessen. Here, larch was introduced about 1740 and has been under intensive management since 1830.[3] In one 119-year-old stand, the average tree height is around 140 feet and the average diameter about 21 inches. In this area, the ideal is a two-storied stand of larch over beech of the same age. When the rotation age of 140 years is reached, the stand is heavily thinned and the beech is reproduced by the uniform shelterwood method. After two or three years, wide strips are cleared of all but a few larch trees. Across these, narrow strips are grubbed by a hoe at frequent intervals to serve as seedbed for the larch reproduction. If adequate reproduction of larch is

[3] Gothe, H. 1948. Drei Waldbegange im Graft. Forstamt Schlitz (Three forest districts in the Forest of Count Schlitz). Die Larche, die Kiefer und die Fichte (Larch, Scots pine and Norway spruce). Privately printed. 70 pp.

not obtained within a few years, seedlings are planted. To assure the dominance of the intolerant larch over the older tolerant beech, the beech is decapitated where necessary in a cleaning operation.

Prof. Schober of Hann-Münden has recently published a comprehensive monograph on European larch in Germany (see literature summary to appear with final part of this article). In his school forest (Forstamt Kattenbühl), a 103-year-old stand of European larch mixed with beech and single stems of oak has produced a much greater yield than either pure larch or pure hardwood stands and a somewhat greater yield than even Norway spruce on the same site. It is believed that such managed two-storied stands of a tolerant species grown under an intolerant one give a higher yield than can be obtained from selection forests or from stands grown under the so-called "natural" systems of silviculture. Incidentally, Japanese larch is considerably faster-growing than European larch on this forest.

Swiss Silvicultural Systems

Swiss silviculture is based very largely upon ecological principles. Swinging away from the pure, even-aged stand and strong-arm methods of treatment, the Swiss have come more and more to rely upon studies of the natural vegetational types and natural successional trends as a basis for their silviculture. The mixed, uneven-aged stand has become the ideal. Even though many stands in actuality do not approach this ideal and cannot be said to be true "selection" stands, the principles of selective cutting can usually be applied.[4]

The aims and advantages of the Swiss selection system are given in the following paragraphs by Dr. Badoux:

> The selection system keeps all ages intimately mixed on the ground. Blocks of a single species are avoided. Mixed woods regenerate more freely than pure woods: spruce comes up more freely under silver fir and silver under spruce. Fellings are strictly limited and are based on the relation of the actual to the ideal growing stock and on the ascertained increment (results of the Méthode du Contrôle!). The very large trees gradually become isolated and put on "light increment" while a sufficient number of smaller trees receive a small amount of overhead light and a great deal of side light.
>
> As the canopy is always broken and uneven, the older trees have a great depth of crown, and many Swiss foresters aim at having ⅔ of the height of a tree covered with living branches. In their early growth the trees are so shaded that they grow very slowly. Grown in this way, a tree which is 120 feet high will have a tight core of annual rings in the middle and clean timber outside.
>
> Scattered giants — mostly silver firs — in a matrix of smaller timber trees and younger regeneration: when the big trees are ultimately cut, the fellers sometime prune the branches to reduce the damage which they would otherwise cause. Growing stock: as a rule ten times the length of the biggest trees (growing stock expressed in cubic meters per hectare and height in meters). In the Emmental (Emmen Valley), the growing stock is 5000 to 8000 cubic feet per acre.
>
> Windfall is far less in selection forests than in high forest: the same applies to snow-break.
>
> The crowns, the stems and the butts of the young poles and semi-mature trees must not be damaged in felling and bushing operations. Careful extraction is necessary and can only be done by well-trained workers.

Actually, probably only about 15 percent of Swiss forests can truly be said to be selection-type forests. These are primarily fir-spruce-beech mixtures on the better soils. Classical examples are the communal forests of the Val de Travers in the Jura Mountains, especially those of Couvet and Bovaresse. It is in these forests that Biolley worked out the principles of the méthode du contrôle, and it is here that the nearest approach of truly all-aged mixed stands can be seen.[5]

The Swiss foresters proceed very slowly in the conversion of even-aged sections of the forest to selection form. At Couvet, after 70 years of selection management, there are still many segments of even-aged stands. Vigorous stands are not sacrificed for principle. Also, the different species are grown more or less separately in groups, each large enough to permit selection of better stems.

Another interesting selection-type forest is that of Oppligen, south of Berne. Here the forest is principally of fir although spruce makes up 20 percent of the volume. It has at present an unusually high proportion of the stand in the older age classes and therefore it presents too regular an aspect to be considered a true selection-type stand.

There is no proof as yet that selection forests produce a greater yield or better quality material than do even-aged forests, although several studies have dealt with this problem[6] In general, the opinion seems to be that selection management probably does not materially increase growth, but that it does reduce losses from various agencies.

Despite the interest in the selection system, most Swiss forests continue to be managed by the Swiss Femelschlagbetrieb (shelter-cut management), which might be defined as the application of selection principles to more or less even-aged stands. The system "consists in thinning the pole crops, 50-60 years of age, sufficiently to establish advance regeneration, and then in felling the overwood gradually over a long period of 60 years or so, concentrating in the first instance on removing the poorer trees and secondly in setting free the best trees to develop into first-class timber of size." The chief characteristic of the method is that no rotation age is set. The reproduction is established at the conventional age. Since it consists of tolerant species (beech, fir and spruce), there is no great hurry to release it. Therefore, the overstory trees are allowed to grow as long

[4] Leibundgut, Hans. Waldbauliche Untersuchungen über den Aufbau von Plenterwaldern. (Silvicultural investigations into the structure of selection forests). Mitteilungen der Schweizerischen Anstalt für das forstliche Versuchswesen. Vol. 24. No. 1. 1945.

Leibundgut, Hans. Grundzüge der schweizerischen Waldbaulehre (Characteristics of Swiss silvicultural science). Forstwissenschaftl. Centralblatt. Vol. 68. No. 5. 1948.

[5] Favre, E. Cinquante années d'application de la Méthode du contrôle à la forêt de Couvet (Jura neuchatelois) (Fifty years of application of the control method to the forest of Couvet). Journal forestier suisse. Nos. 4, 5, 6. 1943.

[6] Badoux, H. and H. Burger. Recherches sur l'accroissement dans une forêt jardinée et dans un peuplement pur d'épicéa (Investigations of growth in a selection forest and a pure spruce stand). Journal forestier suisse. 3:75-78. 6:140-144. 1927 and 1929.

as they are vigorous. The final few trees in the overwood are almost completely free to grow and thus can attain large size and high value. Despite the gradual removal of the overwood, however, the young stand remains even-aged in character and the method cannot be classified as a variant of the selection system.

Clear-cutting in Germany

The first thing that most German foresters show their American visitors today is the large area of forest clear-cut immediately after the war. Most of this clear-cutting was done during the first winter of occupation primarily to supply fuel to the destitute German cities, but also, especially in the French and British zones, for reparations purposes.

It is easy to understand the horror of the German foresters at this first clear-cutting because such devastating forest practices are completely new to Germany and foreign to the whole training of the German foresters and people. At the same time, the visitor cannot but be impressed with the overall good condition of the German forests. Coming from Scotland where perhaps 70 percent of the merchantable forest was clear-cut during the war by the victors, the small acreage of clear-cut areas in Germany seems insignificant, especially when one realizes that a large share of the timber went to succor the German people themselves. Of course, there is devastation, but it is being rapidly and efficiently overcome by artificial reforestation.

There are several large clear-cut areas in the vicinity of Munich. In the Hotoldinger Forest (Saurlach District), heavy post-war cuttings for fuel were made. Reforestation is now being carried on by turning a piece of sod one foot square to each side, making a scalped spot one by two feet in dimensions. Spruce is the principal economic species being replanted, but considerable quantities of both overstory and understory hardwoods are being mixed in. In Forestenrieder Park, an old royal hunting ground of the Bavarian kings, the land is first ploughed with a double furrow plough so that the scalped strips and the sod spoils cover the entire area. Both spruce and oak are used for planting stock, the latter being directly seeded into old bomb holes. Finally, in Fürstenfeldbrueh Forest, a large area on which the trees were windthrown in 1946 is being replanted after ploughing between the stumps. The common denominator in all three cases is that mineral soil is also exposed before planting is begun. In this, German practice bears much more similarity to Scottish planting practice than to American. Control of the brush by ploughing or scalping seems to be the single most important factor in the reclaiming of clear-cut areas.

The same problem is to be seen throughout Germany. Near Phillipsburg in northern Baden, large areas of clear-cut Scots pine on the sandy Rhine Plain are being reforested by double-furrow ploughing followed by planting of Scots pine, Douglas-fir, red oak, and other hardwoods. Again, along the Harz summit, there is much clear-cut land that formerly supported spruce and which is being reforested again with pure spruce.

In all replanting programs, considerable attention is given to the development of windfirm strips, as even-aged stands in Germany are much subject to windfall damage. For instance, in the Bavarian plain, two-storied stands of hardwoods (intolerants over tolerants) are established in strips 100 to 130 feet wide on the windward side of the softwood blocks or even all around the blocks. At Hann-Münden, Prof. Schober recommends that spruce stands be protected from the wind by strips 70 to 100 feet wide consisting of larch, Scots pine, and whatever hardwoods are suitable to the site.

Pure Versus Mixed Stands

A classical and controversial silvicultural problem in Germany revolves around the relative merits of pure and mixed stands. The forest history of Germany, and indeed, of much of western Europe, falls into three distinct periods. The first lasted up to the early 1800's. In this period, the early foresters worked almost entirely with the native forests which were, except for the mountainous areas, chiefly composed of hardwoods. During the 19th century, however, the practice was to clear-cut the original forest and to plant pure stands of conifers, chiefly Norway spruce and Scots pine. This era lasted up to about 25 years ago when widespread soil deterioration in Saxony and Switzerland caused a reassessment of forest policy and an awakening interest in mixed and uneven-aged forest stands. Areas where partial cutting had been practiced, such as the Swiss forests of Couvet and Bovaresse under the direction of Biolley and the Dauerwald (continuous forest) of the Barenthoren Estate, became meccas to the younger foresters. In this third period in forest history, the goal has become the mixed forest in which part of the stand is given over to economic species and part is reserved for species kept for soil improvement and protection purposes.

In Switzerland, where the record of site deterioration at the lower elevations was particularly marked, and where danger of snowbreak, icebreak, and windbreak is especially high, the tendency is to emphasize safe species and to closely emulate naturally occurred climax and near-climax associations. Economic species not native to the particular site are introduced, but on the average make up only about a quarter or so of the stand.

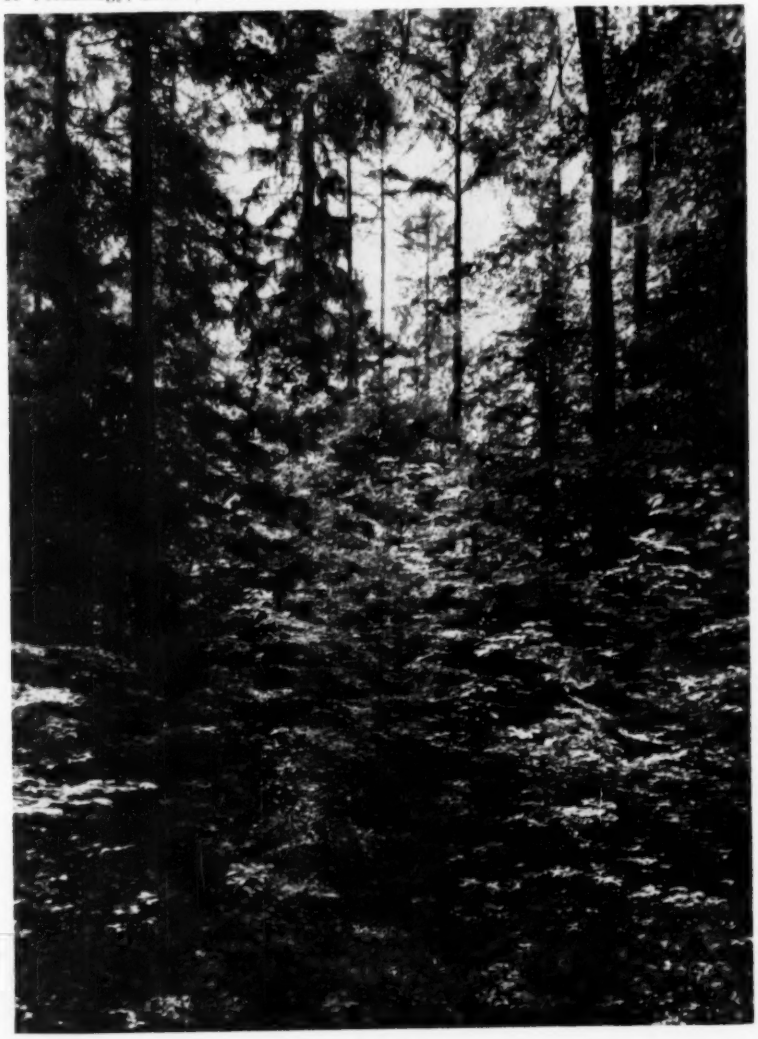
In Germany, the percentages are roughly reversed. Economic species make up three-quarters or more of the stand; while less than a quarter is reserved for soil-building and protection species. For example, in the Munich plain, the old pure stands of spruce have proven unsatisfactory because of wind and nun-moth damage. The present aim is to keep spruce as the major species but to introduce single stems of hardwoods to make up 20 to 30 percent of the stand. In holes opened up under established stands pure hardwoods are introduced.

Another approach is that recommended by Prof. Schober who believes that two-storied stands can combine both high yield and biological safety. Depending upon the site, larch, pine or oak can be used for the overstory while an understory of beech, maple, and other more or less tolerant species serves to increase production, protect against windbreak, and keep the boles of the larger trees clear.

At the higher elevations, where spruce is climatologically and edaphically suited to the sites, it can often be grown in pure stands with safety. At Oberreifenberg in the Taunus hills in Hessen, a comparison of soil qualities has been made between a pure spruce stand and an adjoining stand of the same age made up equally of spruce and beech of the same age following pure spruce. No evidence was found of soil deterioration under the pure spruce, and no evidence was found of soil betterment under the mixed stand. In both cases, the rate of downward movement of calcium, potash, and phosphate was at about the same low rate. The conclusion was that this particular site can safely support pure spruce, but that a mixture of about 80 percent spruce and 20 percent beech will result in somewhat better humus conditions.

Along the summit of the Harz uplands in central Germany, where the elevation ranges around three thousand feet, pure species has been grown for more than a hundred years. This is the only large area in Germany where a continuous monoculture has been maintained. Despite the fact that the pure stands of spruce were not characteristic of the original forest, no evidence of soil deterioration has been found, and the monoculture is being continued. The most striking thing about the forests of this region is the scarcity of any other woody plant than spruce, whether under the old stands or after clear-cutting.

FIG. 3.—Selection forest of spruce, fir, and beech. School forest, Federal Institute of Technology, Zurich, Switzerland.



Obtaining Natural Regeneration in Germany

American foresters sometimes tend to think of German silviculture as a series of hard and fast cutting plans, termed silvicultural systems. We have all been exposed in our student days to the various types of shelterwood, strip cutting, and selection systems, as well as the more complicated types detailed in Troup's book on silvicultural systems. In actual practice, however, the method of cutting German stands to obtain reproduction seldom follows this or that formal system. Furthermore, the way the stand is cut is but a single factor governing the obtainance of natural regeneration. Of equal importance is the control of grazing and the preparation of the seedbed.

Many European tree species will reproduce naturally under a wide variety of cutting plans if a satisfactory seedbed exists, and if the seedlings are protected from deer and other wildlife. Much more attention must be given to the latter two points than to the plan of cutting. A few examples will suffice.

In the Zwiesal East district of the Bayerischer Wald on the Czechoslovakia border, beech, spruce, and fir are reproduced first by fencing reproduction areas from the deer and elk, and then by hoeing seedspots under the partially cut old stand. The shelterwood system is used, but it is only successful if the other measures are taken. Furthermore, the composi-

tion of the young stand must be regulated by cleaning operations. Beech ordinarily comes in heavier than the spruce and fir and must be cut back to obtain the desired mixture.

In the Odenwald to the east of Heidelberg, the shelterwood system is again used. In this area, fencing is not necessary because of the concentration of American soldiers today in Heidelberg and the consequent reduction in the local deer population. Beech is the principal species, but spruce, pine, and larch are also important. The first shelterwood cut is uniform throughout the stand. It must be light on the good lime soils to avoid brush development, but should be heavier on the poorer sandstone soils. Final cuttings are of the strip shelterwood type and are timed to meet seed years. They must be heavy enough to obtain regeneration, but light enough to permit the stand to close without brush development if the seed is insufficient. The direction of cutting is determined by the prevailing west wind. Although neither fencing nor seedbed preparation are commonly needed in this forest, the method of cutting does not conform to any particular shelterwood system, but rather partakes at various times of the characteristics of the uniform shelterwood, strip shelterwood, and strip clear-cut systems.

At Oberreifenberg in the Taunus (Hessen), natural spruce reproduction is most easily obtained on the intermediate sites. On the better sites, there is apt to be too much competition from grass, while on the poorer sites, survival is apt to be poor. Where natural regeneration fails, planting is resorted to. In fact, the general objective of German silviculture seems to be to get natural reproduction if possible, but not to hesitate to underplant or plant (or seed in many cases) if there is any question about getting the natural stand. Two or three years is long enough to wait for natural reproduction. Seeding and planting are used especially to obtain the desired mixtures. For instance, beech is often introduced where the spruce reproduction is too heavy; while spruce and fir are added where there is naturally a predominance of beech. The superabundant reproduction of any one species is held back by decapitating the seedlings.

In the southern Harz Mountains at Wieda and Walkenreid, regeneration areas must be fenced. These fences may be made of locally gathered materials or they may be more carefully made in sections so that they may be moved from place to place. Fencing is particularly essential for hardwood regeneration and is the single most expensive item in the reproduction process. At Wieda, the general method of reproduction is to begin with shelterwood cuts to bring in the tolerant beech and to follow up with strip clear-cutting to bring in ash and maple. The first beech seedlings will be of poor form and must be cut back to obtain straight seedling sprouts.

Further examples of the means used to obtain natural reproduction are cited in the preceding section on larch and in succeeding sections on oak and beech. In all cases, there is much latitude in the method and intensity of cutting, but it is essential to control wildlife grazing and to provide a favorable seedbed. Obtaining natural regeneration in Germany is truly much more than the adoption of a given silvicultural system.

Beech Culture

Beech and oak are the most important hardwoods in western Europe. With both trees, intensive silvicultural care is necessary to produce quality crops.

European beech in its natural state is not particularly a well-formed tree. To obtain good stems, dense plantings are made or dense natural reproduction is obtained, and frequent selective cleaning operations are relied upon to select the few straight and well-formed individuals for the final crop. In cleaning or weeding operations, only the top of the crown is normally cut off rather than the entire stem.

A common aim in beech management is the development of veneer or high-quality saw logs. At Wieda in the southern Harz Mountains, the objective is a veneer quality stem with a d.b.h. of 20 inches. Here a representative 120-year-old stand had an average height of 94 feet and an average diameter of 14 inches. The crop trees favored in the four previous thinnings, however, had an average diameter of 17 inches.

It can readily be seen that thinning must be resorted to in such stands in order to produce high quality stems in a reasonable period of years. Past experience has shown that the grade or type of thinning has little effect on the overall wood production of the site as long as it is not too severe.[7] Wood production is affected markedly only if the basal area per acre is dropped below 100. Optimum density for volume production on an area basis is from 120 to 150 square feet per acre. A typical example of the beech thinning regime from the Odenwald near Heidelberg involves light high thinning for beech stands up to 60 years old for the purpose of obtaining quality stems, heavy high thinning from 60 to 80 years for the purpose of isolating the best stems as crop trees, and light management (Lichtwuchsbetrieb) after 80 years, to obtain high diameter growth.

Reproduction is usually obtained by some variant of the shelterwood system. In the Odenwald, where the rotation age for beech is 120 years, the first cut is a uniform shelterwood cut to prepare the seedbed and increase diameter growth of the remaining stems. The final cuts are of the strip shelterwood type, timed to meet seed years. In the Harz, a similar system is used except that beech restocking is aimed for in the uni-

[7] Assmann, E. Grundflachen- und Volumzuwachs der Rotbuche bei verschiedenen Durchforstungsgraden (Basal area and volume growth of beech at different thinning grades). Forstwissenschaftl. Centralblatt 69(5):256-286. 1950.

Assmann, E. Die Buchen-Hochdurchforstungversuche der ehemaligen Preussischen Versuchsanstalt (The beech high thinning research of the former Prussian Research Station). Forstwissenschaftl. Centralblatt 69(7):373-421. 1950.

form shelterwood cuts while less tolerant hardwoods are later promoted by strip cuts.

Oak Culture

Oak is the slowest growing of the important European forest trees, but it is of high value in veneer log sizes. Foresters who devote themselves to oak culture form something like a cult devoted to a high expression of silvicultural art, despite the fact that hardwood culture is constantly giving ground to softwood and mixed wood culture.

A famous oak locality is Salmünster in the Hessen portion of the Spessart Hills, east of Frankfurt am Main. Here the aim is to grow oak veneer logs on medium sites. This "wertholz" (valuable wood) culture is based upon a 300-year rotation, stems with a d.b.h. of 24 inches, and annual wood is kept so small that the wood can be sliced for high-grade, high-quality veneers.

Such slow growth is best obtained on intermediate site classes (III). One 400-year-old stand has an average height of 88 feet and an average diameter of 28 inches. To obtain reproduction, the stand is first enclosed with a wood rail or wire fence to keep out deer and elk. The preparatory cut of the uniform shelterwood system must be light enough to keep out grass, and heavy enough for beech litter decomposition and the subsequent preparation of the seedbed. About 70 percent of the area is naturally restocked to oak. The rest must be seeded with acorns gathered around the stand. As a full seed year occurs only every 8 to 10 years, the reproduction period normally takes about 10 years. Since about 20 percent of the overwood after the first shelterwood cut should be beech, beech reproduction is obtained at the same time as the oak.

Throughout the life span, the oak is kept slow growing by keeping the stand dense (at about 150 percent of yield table standards). Beech is used to clothe the oak stems and prevent epicormic branches. To keep the beech subordinate to the slower-growing oak, the dominant beech saplings must be decapitated from time to time. Beech is also grown in pure borders 30 feet wide around the oak blocks. Each block is visited every three years for examination and possible treatment. Thinnings are very light, and great care is taken not to release an oak too quickly as growth rings of unequal width limit the value of the stem for veneer. If no beech comes in naturally, it is planted when the oak is about 70 years old.

The oak culture at Salmünster is perhaps an extreme case of quality silviculture and single tree management. Yet, the same principles are applied elsewhere. At Walkenreid in the southern Harz, the rotation is only 180 to 200 years. Thinnings begin early and are made every two to three years but there is less care of the stand in later life and less emphasis upon slow growth than there is at Salmünster. The ideal here is an oak high forest with an understory of hornbeam and beech. Fencing is essential to obtain hardwood reproduction. At Hann-Münden, frequent decapitation of the beech is avoided by planting the beech 30 to 50 years after the oak becomes established. The period varies with site. It should be long enough so that the beech will not suppress the oak, but short enough so that the beech will reach usable size (usually for fuelwood) by the end of the oak rotation. Finally, at Nancy in France, the rotation is 200 years or more but only the best oaks are left as standards for this entire period. It is often possible to raise two understory crops of beech for fuelwood and for stem protection purposes within one oak rotation. The common denominator in all these examples is the wish to avoid erratic growth as European oak has so little springwood in relation to summerwood that it can be used for veneer if growth irregularities can be avoided.

Ecology and Silviculture of the Spruce-Fir Forests of Eastern North America[1]

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Using the climax forest as a guide to growing the species best suited to the climate and the site, the author offers a silvicultural system for managing the spruce-fir forests of eastern North America. Based on ecological principles, such silviculture is aimed to bring about forests that are inherently healthy and have a natural resistance to insects and disease.

THE LAW of supply and demand has done much in recent years to lift timber growing into the category of a paying enterprise. Nevertheless the business of growing timber is still attended by many hazards.

Some of these have their origin in economic disturbances over which the timber-land owner has little control. Other hazards, however—particularly those of climatic or biologic origin such as insects, disease, windthrow, and fire—the timberland owner can do much through intelligent silviculture to circumvent. But the plain facts are that through inept manipulation of the forest he often does the very things that tend to perpetuate and intensify the hazards.

This is strikingly evident in the spruce-fir region. Poor logging practices, abetted by fire and other destructive forces, have seriously impaired the forests' productive powers and resistance to forest pests. Ill-conceived cutting practices have brought about radical changes both in composition and stand structure; often incoming stands are only remotely related in composition to the original forest. Such forests are often subject to rapid deterioration and are frequently prey to disease and insect epidemics.

The poorly stocked, deteriorated, pest-ridden forests of today are essentially the result of yesterday's failure to evolve a spruce-fir silviculture based on truly sound ecological principles.

Origin of the Spruce-Fir Forests

The eastern spruce-fir belt extends from Newfoundland westward to the great plains of Manitoba and Dakota, a distance of more than 2,000 miles. For 1,200 miles or more it straddles the boundary line between Canada and the United States. It sends long tongues far to the south—but only along the high ridges and lofty summits of the Appalachian ranges. To the north, fingers of spruce follow the relatively warm north-flowing streams well into the treeless, moss-covered tundra.

The commercial spruce-fir belt averages about 300 miles in depth. A wide strip of nearly pure coniferous forests occupies its upper portion. Below it lies the transition zone. Admixtures of hardwoods, largely intolerant species, occur here. In the lower strip of this zone tolerant hardwoods tend to supplant the intolerant ones. Still farther south, spruce and fir give way to forests of deciduous hardwoods.

The silvicultural significance of the spruce-fir climax types becomes more evident when viewed in terms of their geological origin. The present pattern of spruce-fir types is linked with the last great ice sheet that invaded the spruce-fir region from the north. This phenomenon profoundly affected the topography and soil. In some places the ice swept the surface practically clean of soil. Over the region as a whole, however, it dropped a mantle of heterogeneous debris, spreading it indiscriminately over hills, mountains, plains, and valleys to varying depths.

This glacial debris, consisting of clay, sand, gravel, rock, and boulders, sometimes filled valleys to a depth of 300 feet or more. Often the drift was pushed up in great heaps and windrows. It piled up in dams across valleys to form lakes and ponds. It created kames and eskers, outwash plains and terraces, enormous terminal moraines, and great boulder belts. Ice gouged out depressions to form swamps and muskegs.

When the ice made its final retreat some 10,000 years ago, the forests again moved northward. But glaciation, by changing the topography, soil, and drainage, had created a pattern of sites quite different from what prevailed in the preglacial era. This forced a redistribution of species within the region. The effects of these changes are expressed in today's pattern of climax forest associations.

Following the retreat of the ice sheet, pure coniferous forests of spruce, balsam fir, and jack pine—or combinations of these species—reclothed the shallow soils of the north and the thin soils of steep mountain slopes. Spruce, balsam fir, and cedar—often with admixtures of white birch and aspen—took over the flats; black spruce, tamarack, and cedar invaded the swamps and muskegs. But on the deeper soils of the lower slopes, benches, and low-lying ridges to the south, conifers shared the sites with such hardwoods as beech, birch, and maple.

Essentially these forests are expressions of the fundamental laws that govern distribution and growth of vegetation. In their climax stage they represent Nature's verdict, based on thousands of years of experimentation, of the species or combinations of species that are best adapted to the sites.

The Climax Forest as a Guide

For managing today's spruce-fir forests, the forester needs a simple yet dependable guide that will enable him to direct his silviculture toward the production of those species best suited to the climate and the soil. Such a guide can be found in climax forest associations.

[1]Paper presented at the joint meeting, S.A.F.-C.I.F., Montreal, Canada, Nov. 1952.

The stable tree associations that characterize such forests are best adjusted to meet the impact of diseases, insects, and other antagonistic forces.

Climax forest associations are in complete harmony with the soil and the plant and animal life they support. They are inherently healthy.

My thesis is that by using climax forests as silvicultural guides it will be possible to prevent the development of conditions within the forest that make the business of growing timber both costly and hazardous. In essence this is "preventive forestry," analogous to "preventive medicine." This type of approach promises thriftier, healthier, more resistant forests—thus more productive ones.

A fact of great significance to foresters is that climax forests are integral biological units. Each such unit is characterized by a distinctive climatic-edaphic complex. Environmental differences are of sufficient magnitude between units to effect pronounced differences in growth behavior.

This is clearly expressed by marked differences in composition, growth capacity, ease of regeneration, factors of competition, and liability to windthrow, disease, and insect pests. These basic differences dictate to a large degree the type and intensity of silviculture to be employed for most efficient management. Thus, climax forests provide a sound and natural basis around which to build a successful regimen of silviculture.

The Goal of Spruce-Fir Silviculture

Owners of spruce-fir forests in the eastern United States and Canada usually have as their primary goal the production of pulpwood—preferably spruce and fir. Because spruce has been the top-ranking pulpwood species, it is the favored tree for management.

Where these goals conflict radically with the principle of striving for stand compositions and structures characteristic of the respective climax groups, goals should be altered so this silvicultural principle can be achieved.

In this paper I am attempting to show a level of silviculture considered optimum for the existing sites and the requirements of the tree species that characterize them. The measures prescribed are aimed to maintain an acceptable proportion of spruce and balsam fir and to promote healthy, rapid-growing forests, thereby attaining maximum sustained increment and quality production.

These objectives may involve curtailing present profits in the interest of greater future returns. Thus, high-order silviculture is implied. The measures are based on the findings and experience of numerous agencies and individuals working in the field of spruce-fir management both in Canada and the United States. Existing literature dealing with the ecology and silviculture of spruce and balsam fir has been freely drawn upon.

The extent to which high-order silviculture will be applied will be influenced in a large measure by economic conditions and the quality of the forest sites. Because of remoteness from markets, poor transportation development, low potential productivity, character of timber, etc., only extensive forestry will be justified for certain portions of the region. On the other hand, productive lands close to markets justify intensive forestry practices.

The Problems in Silviculture

Depleted and Deteriorated Stands

To attain spruce-fir management goals, the measures employed must restore depleted and deteriorated stands and forestall the creation of such conditions in the future. The need for refined and often costly cultural measures to bring vast areas into a satisfactory producing state is plain indication of failure in the past to properly correlate cutting practices to silvicultural requirements.

Through proper cutting methods it is possible to forestall the need for later costly cultural measures. Intensive forestry and costly forestry are not necessarily synonymous terms. High-order forestry in the hands of a skilled practitioner can be quite simple and inexpensive, yet highly efficient in attaining forestry objectives.

The more commonly encountered conditions in spruce-fir forests that call for remedial action are:

1. Regeneration failures.
2. Badly understocked stands.
3. Deteriorated growing stock.
4. Mounting losses from insects, disease, wind, and fire.
5. Low increment rate.

These five conditions occur in varying intensities and combinations throughout the spruce-fir region. Thus, all the standard practices that form the repertoire of the practicing forester, ranging from cutting methods to stand-improvement and protection measures, must be brought to bear on the problem if the overall goals are to be realized in a reasonable period.

This does not mean that each acre will require all remedial measures, but it does mean that on the tract as a whole all measures can be employed to good advantage. Execution of one measure tends to increase the effectiveness of the others. It is imperative, then, that the forester exercise discretion to assure that the corrective measures applied are silviculturally and economically appropriate for each site and stand condition.

It is impractical in this short paper to attempt to present all the variations in silvicultural practices demanded by the diversity of conditions existing in a territory as extensive as the one under discussion. The practices here recommended take the form of a broad framework that will help to establish broad principles, but flexible enough to permit choosing the method that will best fit local conditions.

Even so, basic cutting methods need not differ greatly between the western and eastern ends of the region despite the more difficult regeneration problems associated with midcontinental climates. True, silviculture will vary in detail, but only to the degree that coordination demands adjustments in keep-

ing with the local complex. Because of harsher climatic conditions in the West, silvicultural measures must be undertaken there with greater precision and care to assure attainment of silvicultural goals.

Factors in Management

It goes almost without saying that the presence or absence of advance spruce-fir reproduction in the forest strongly influences the nature of the silvicultural measures to be practiced. Fortunately advance reproduction is abundant over most of the region. This is especially true of the so-called old-growth stands in the spruce-fir type group.

It is usually abundant also in the spruce-fir-hardwood group but is often inadequate or entirely lacking in the hardwood-spruce-fir group. Paucity of spruce-fir reproduction in this type group is usually due to its failure to compete successfully with hardwoods.

Second-growth stands not yet mature are also likely to be deficient in reproduction regardless of type group. The extremely dense canopy that characterizes young stands and the thick accumulation of needle litter on the forest floor tend to discourage the establishment of reproduction. Reliance for regenerating such stands must be placed on cutting methods especially designed to accomplish this.

Since advance reproduction is vital to continuance of lands in spruce-fir production particularly in those sites favorable to hardwoods, measures must be applied to assure its preservation and development. Fortunately, spruce-fir reproduction responds admirably to release. But to maintain its dominance over competing hardwoods it needs a height advantage that must increase as hardwood competition increases. Obviously such competition reaches its maximum in the hardwood-spruce-fir type group.

Spruce-fir management practices must take into account the silvical variations among the species that comprise the various spruce-fir types. In this respect the variations in tolerance among the various spruces and balsam fir is of special significance. Red spruce is the most tolerant of the group, followed by balsam fir, black spruce, and white spruce in that order. Thus red spruce enjoys a competitive advantage over balsam fir as well as white and black spruce when these species occur as associates.

However, balsam fir possesses certain compensating qualities. It seeds much more prolifically than the spruces. Its seedlings have a remarkable capacity for prompt and rapid root development and subsequent rapid height growth. These advantages are partly offset by the greater longevity of the spruces. Net results, however, are highly favorable to abundant balsam fir regeneration on most sites, thus making the problem of balsam fir encroachment difficult to overcome.

Despite the fact that balsam fir grows faster and regenerates more easily than spruce, it is questionable that balsam fir production will provide greater yields per acre over an indefinite period. The advantages of rapid growth and prompt restocking that balsam fir enjoys are largely offset by its lesser yield of cellulose; its susceptibility to numerous forest pests such as heart rots, the wooly aphid, and the budworm; and the losses it sustains from wind-breakage and sun-scald. These factors all add to the complexity and difficulties of spruce-fir management, which increase as balsam fir representation in the stand increases, and reach their maximum in the so called "balsam fir thickets."

One must recognize, however, that sites occur that are optimum for balsam fir only. On such sites production and continuance of balsam fir as predominant or sole species is a legitimate goal.

But by the same token, where spruce is the dominant tree in the climax it should be maintained to the extent of its original representation in the stand. Silviculture so directed will be most satisfactory in the long run. This means putting into effect a form of silviculture designed to reverse the trend of balsam fir encroachment to the stage where the original spruce-balsam fir ratio is regained.

Another important factor influencing management practices is danger from windthrow and windbreakage. Although spruce and balsam fir are tolerant species naturally adapted to a selective system of cutting, a strong tendency to windthrow prevails because of their shallow root systems and the thin soil in which they commonly grow. High winds will often overthrow all trees on extensive areas. Where the trees grow in mixture with hardwoods, they receive support from their deeper-rooted associates, and this greatly reduces this danger. Balsam fir, being subject to weakness from heart rot, is particularly susceptible to wind-breakage.

Classifying the Forest Types

In applying the climax-forest principle to spruce-fir silviculture, the first requirement is to classify the forests into climax associations. Such a classification enables the forester to segregate forest types into classes biologically of the same value.

Biologically equivalent types, by and large, respond the same way to forestry measures. This is of practical significance to the forester. It permits him to delineate his properties into zones calling for uniform silvicultural treatment. Also it simplifies the problem of classifying sites for various levels of forestry practice commensurate with the potentialities of the site for growth and profitable returns.

Delineation of climax types is relatively simple where forests still occur in their natural state. Unfortunately extensive areas, because of repeated fires and other radical disturbances, now support a variety of temporary types. Even so, foresters versed in successional trends peculiar to the spruce-fir forest belt can interpret these conditions satisfactorily in terms of climax associations.

Such a classification has been attempted for the spruce-fir belt of eastern North America (Table 1). Absolute accuracy is not claimed

TABLE 1.—S.A.F. FOREST TYPES CLASSIFIED BY CLIMAX GROUPS AND MANAGEMENT OBJECTIVES

Forest type	S.A.F. type No.	Stage in succession	Ultimate climax group	Species to favor
				Primary
Red spruce	18	Climax	Spruce-fir	Red spruce
Red spruce-southern balsam fir	19	Climax		White spruce
Balsam fir	22	Climax		Black spruce
Black spruce	23	Climax		Balsam fir
Jack pine	1	Subclimax		*Secondary*
Tamarack	25	Subclimax		Paper birch
Aspen	4	Subclimax		Aspen
Pin cherry	5	Subclimax		Cedar
Paper birch	6	Subclimax		Tamarack
				Jack pine
				Primary
Red spruce-yellow birch	16	Climax	Spruce-fir-hardwoods	Red spruce
Red spruce (old field)	18	Subclimax		White spruce
Paper birch-red spruce-balsam fir	20	Subclimax		Balsam fir
White spruce (old field)	21	Subclimax		Yellow birch
White spruce-balsam fir-paper birch	21	Climax		Paper birch
Aspen	4	Subclimax		*Secondary*
Pin cherry	5	Subclimax		Aspen
Paper birch	6	Subclimax		Beech
Yellow birch	15	Subclimax		
				Primary
Red spruce-sugar maple-beech	17	Climax	Hardwoods-spruce-fir	Red spruce
Red spruce (old field)	18	Subclimax		Yellow birch
Aspen	4	Subclimax		Sugar maple
Pin cherry	5	Subclimax		*Secondary*
Paper birch	6	Subclimax		Balsam fir
Sugar maple-beech-yellow birch	12	Subclimax		Aspen
Yellow birch	15	Subclimax		Paper birch
				Beech

for this classification, but it is believed accurate enough to satisfy most practical needs.

Three broad climax groups are recognized: (1) spruce-fir, (2) spruce-fir-hardwoods, and (3) hardwoods-spruce-fir.

Within each group occurs a series of temporary and climax forest types, each of which is recognized as a legitimate component of its respective climax group. Of the 25 forest types listed, only 7 are considered to be in their climax stages. The remaining 18 may be assumed to represent transitional stages in a successional series which, if left undisturbed, would ultimately develop into one of the three climax group associations. All of the forest types bracketed under a given climax group are considered to be biological equivalents.

The species that characterize the original site have been selected as primary goals for management. But it does not follow that climax species should be considered the sole goal. Species associated with one or more of the successional stages leading to the climax may be equally legitimate goals. Under special conditions they may well become the primary goals.

Species considered to be the goals of management for each type group are shown in Table 1.

Characteristics of the Climax Groups

Each climax group possesses characteristics that make for easy or difficult management of spruce. Normally this difficulty increases with increase in soil fertility level. This is explained by the fact that deep, fertile, well-drained soils result in increased proportions of hardwoods.

But in regions with dry and continental climate, drought rather than increased soil fertility is the major factor favoring increased proportions of hardwoods. And hardwoods, particularly tolerant species, compete strenuously with spruce and fir for possession of the site. Thus the extent to which hardwoods are natural components of a site largely determines the management level required to assure satisfactory spruce-fir representation.

The hardwood-spruce-fir climax group, with its relatively fertile soils and consequent high representation of tolerant beech and sugar maple, is least susceptible of the climax groups to spruce-fir management. These hardwoods compete strenuously with spruce and balsam fir for possession of the land. To maintain spruce-fir production on these sites calls for the application of intensive forestry measures.

In the spruce-fir-hardwood climax groups, competition from hardwoods is less severe. The shallower, less fertile soils discourage production of the highly competitive beech and sugar maple. Instead the less competitive yellow birch, red maple, aspen, and paper birch take over. This climax group marks the transition zone between those easy and difficult to hold in spruce-fir production. Less intensive measures suffice to assure dominance to conifers in this type.

The spruce-fir climax group, with its thin or poorly drained soils, lends itself most readily to the management of spruce and balsam fir. Competition from hardwoods, if any, is wholly restricted

TABLE 2.—TENTATIVE ECOLOGIC SITE CLASSIFICATION FOR SPRUCE-FIR FOREST OF EASTERN NORTH AMERICA

Phytogeographic zones	Recognized forest types	Major type groups	Ground vegetation equivalents	Ease with which spruce-fir production can be maintained
Red spruce	Balsam fir (flat) Red spruce-balsam fir (flat) Red spruce (slope) Red spruce (flat)	Spruce fir	*Hylocomium-Hypnum* *Cornus* *Oxalis-Hylocomium* (*Hylocomium-Hypnum*) (*Cornus-Maianthemum*)	Easy
	Paper birch-red spruce Balsam fir Red spruce-yellow birch	Spruce fir-hardwoods	*Cornus-Maianthemum* *Oxalis-cornus* *Oxalis-cornus*	Moderately difficult
	Red spruce-sugar maple-beech	Hardwoods-spruce-fir	*Viburnum-Oxalis*	Difficult
Black spruce	Black spruce-tamarack Black spruce (swamp) Black spruce-white cedar Black spruce-jack pine Black spruce-balsam fir Balsam fir	Spruce-fir	*Chamaedaphne-Ledum* *Kalmia-Ledum* *Sphagnum-Ledum* *Sphagnum-Carex* *Sphagnum-Cornus* *Sphagnum-Oxalis*	Easy
	Black spruce-paper birch Black spruce-aspen Black spruce-alder	Spruce fir-hardwoods	*Oxalis-Coptis* *Hylocomium-Mitella* To be determined	Moderately difficult
	Aspen-paper birch-black spruce	Hardwoods-spruce-fir	*Galium-Equisetum*	Difficult
White spruce	White spruce-black spruce Balsam fir White spruce-balsam fir	Spruce-fir	*Sphagnum* *Sphagnum-Oxalis* *Cornus-Linnea*	Easy
	White spruce-balsam fir-paper birch White spruce-balsam fir-aspen	Spruce-fir	*Rubus parviflorus* *Cornus-Maianthemum*	Moderately difficult
	White spruce-balsam fir-yellow birch Paper birch-white spruce-balsam fir Sugar maple-white spruce-balsam fir Aspen-white spruce	Hardwoods-spruce-fir	*Aralia* To be determined *Aster-Corylus* (*Smilacina-Polygonatum*) (*Galium-Equisetum*)	Difficult

to light-foliaged species such as aspen and paper birch. Even so, serious problems of regeneration may arise when such sites are subjected to unwise cuttings that encourage invasion of alders and other rank growth, or expose the forest floor to higher temperatures and desiccating winds. But they offer no problem that cannot be solved through intelligent silvicultural treatment.

Site-Quality Classes

It is clear that the type of silviculture will vary among climax-association groups. The intensity of management practices in turn will vary in accordance with the productive capacity of the sites encountered. Thus, there is need for a breakdown of each climax association into site-quality classes.

Such a classification has great value to the practicing forester. It provides him with the needed index to timber yields. Further, it enables him to classify his properties into accessibility-quality-site zones for levels of forestry practice commensurate with the zones' potentialities for growth and profitable returns. Reasonably accurate identification of site quality can be attained through indicator plants, soils, forest cover, and other site manifestations.

An attempt has been made (Table 2) to show ground-vegetation types that characterize the major type groups. For each major group, ground-cover types are arranged on a scale of ascending soil fertility, thus providing a rough basis for classifying major type groups into site-quality classes.

Phytogeographic Zones

In recognition of the wide range in climatic conditions that prevail in an area as extensive as the spruce-fir forests, the region has been subdivided into silviculturally significant phytogeographic zones. The boundaries of these zones are determined by the species of spruce that characterizes each. On this basis the following three species zones are recognized: (1) red spruce, (2) black spruce, and (3) white spruce (Table 2).

Differences in stand composition and site factors, particularly moisture and temperature, are of sufficient magnitude between zones to influence the ease with which major silvicultural goals can be achieved.

In the southeast portion of the spruce-fir belt where red spruce is the characteristic tree, conifer regeneration is not an acute problem. Nor is it especially acute in the extensive black spruce types that characterize the flat terrain and broad shallow basins of the subarctic region.

But where white spruce supplants red spruce, often with admixtures of black spruce, as it does in the Lake States and the interior provinces of Canada, the problem of maintaining a satisfactory stocking of spruce is very difficult. Site

differences and variations in tolerance and competitive capacity of associated species create problems that may necessitate silvicultural adjustments not only between zones but within the same zone.

Thus in dealing with the silvicultural problems of any specific broad climax group it is well to consider which phytogeographic province it falls in. In general, however, basic concepts can be applied to all zones with surety.

Cutting Systems

Main reliance for minimizing the occurrence of the stand deficiencies enumerated earlier should be through the employment of sound systems of cutting. If cutting methods are used that assure a complete cover of desirable reproduction, serious stand deficiencies can be avoided and thus the problem of growing full timber crops can be greatly simplified and production costs can be reduced.

Selection Cutting

Generally speaking, selection cutting promises to accomplish these goals most effectively. Thus all-aged management rates first priority; it is the preferred silvicultural system.

Spruce and balsam fir are both tolerant species well adapted to the selection system. The repeated light cuttings that characterize this system create favorable conditions for the establishment of abundant spruce-fir seedlings.

In the red spruce types, selection cutting definitely favors spruce regeneration at the expense of balsam fir largely because of the greater tolerance and longevity of red spruce. This does not hold true for the white and black spruce types containing balsam fir, since the latter outranks these two spruces in tolerance. However, the competitive advantage greater tolerance gives balsam fir can be largely cancelled by the pressure of frequent cuts of this species under selection management.

The selection system, because it maintains a generous crown cover, discourages the encroachment of hardwood and brush growth. Since accumulation of slash is negligible, it constitutes no deterrent to reproduction. On the moist, shaded forest floor the limited quantities of slash decompose rapidly, reducing fire risk to a minimum. Further, the system affords protection against windthrow. It assures maintenance of a thrifty residual growing stock capable of rapid volume increment and early future harvest cuts. And the short cutting cycles inherent to the system increase yields by reducing the heavy losses sustained from decay in short-lived balsam fir.

To attain maximum benefits from selection cutting, tree-marking should be undertaken on all cutting operations. Through marking, the forester exercises control over the cut both as to quantity and quality. It enables him to reserve healthy, thrifty growing stock so essential to rapid increment. Marking, skillfully done, anticipates mortality. The wood thus saved may even exceed the growth on the residual stand. Diameter-limit cutting, on the other hand, because of its rigidity, only partially accomplishes these objectives.

This does not mean that selection cutting is the only system for spruce-fir management. Economic pressure or unfavorable stand structure or stand condition may require some other system. Of course it does not follow that such cutting is undertaken for the purpose of creating even-aged stands. For a long time to come, spruce-fir silviculture must be based on a compromise.

Shelterwood Cutting

Where economic or other reasons make selection cutting impractical, shelterwood cutting can often be substituted with satisfactory results. Under this system one-third to one-half of the stand may be removed, opening it up uniformly to permit the establishment of reproduction under the shelter of the remaining trees. Ten to fifteen years later, when regeneration is complete, the remainder of the residual stand may be cut.

Scattered-Seed-Tree System

There is little place for the scattered-seed-tree system in the silviculture of spruce-fir stands. Because of the shallow-rooting habits of both spruce and fir there is every likelihood that the seed trees will be windthrown long before they have fulfilled their purpose.

Clear-Cutting

Some conditions occur in the spruce-fir region that call for clear-cutting or some modification of it. Overmature, even-aged stands of spruce and fir are cases in point. The absence or presence of advance reproduction in such stands determines the type of clear-cutting to apply.

Where reproduction of sufficient height and density is present, the entire area bearing such reproduction may be clear-cut. Where reproduction is scanty or absent, some system of strip-cutting should be employed. An effective and at the same time practical system is to cut alternate or progressive strips preferably from north to south and narrow enough (not to exceed 150 feet) to insure restocking from the adjoining uncut strips. As rapidly as the cut-over strips regenerate, the remaining uncut strips may be harvested.

Shelterwood and clear-cutting methods imply even-aged management, hence long-cycle cutting. This is in contrast to all-aged management and short-cycle cutting associated with the selection-cutting system that permit harvesting much of the volume normally lost through mortality under long-cycle cutting.

Adapting Cutting Systems to Stand Conditions

Effective silviculture hinges on proper adaptation of the cutting systems to varying stand conditions. Since each major type group presents its own peculiar set of problems, the type group in which the stand occurs must be borne in mind in the selection of the cutting system and the timing of its application.

Mature and Overmature Stands

The only choice of management for mature and overmature stands is clear-cutting. The danger of loss

from windthrow and defect make this imperative.

The broken canopy that characterizes mature and overmature stands usually provides conditions essential for the establishment of advance reproduction. Thus advance reproduction is nearly everywhere present in such stands.

It is essential, however, that conifer reproduction be of sufficient height to compete successfully with invading hardwoods and other competing growth that follow clear-cutting. The intensity of this competition varies between type groups. In the spruce-fir group, reproduction should average between 6 inches and 1 foot in height; in the spruce-fir-hardwood group about 2 feet; and in the hardwood-spruce-fir between 4 and 5 feet to assure its ultimate dominance.

Perpetuation of spruce and fir will be greatly aided when profitable use can be made of the intermingling hardwoods. Utilization of the hardwood component is the real answer to successful spruce-fir management in the hardwood-spruce-fir type group.

If there is a deficiency of reproduction it is likely to occur in the hardwood-spruce-fir group. No known method of cutting can be counted on to remedy this situation. Clear-cutting, followed by planting and continued treatment for reduction of hardwoods by girdling or other measures, is probably the only way such areas can be maintained in spruce-fir production.

Immature Stands

Selection cutting is the preferred method of managing immature stands. It is best adapted to all-aged stands, but it can also be initiated in even-aged stands with the aim of converting them to selection forests. Because of the susceptibility of spruce-fir forests to wind damage there is a definite limit of intensity of cutting beyond which it is unsafe to proceed. The proportion or volume to remove should be governed by the character of the site and the composition, structure, density, and age of the stand — factors that strongly influence windfirmness.

The older age classes of immature stands should be cut more lightly (10 to 30 percent) than the young stands (20 to 50 percent); cuttings should be lighter in even-aged stands (20 to 30 percent); lighter on wet sites and steep slopes (10 to 20 percent) than on well-drained sites or rocky soils that provide good root anchorage (30 to 50 percent).

Normally wind damage is greater in pure conifer stands than in conifer-hardwood stands. The former should be cut lighter (10 to 40 percent) than the latter (30 to 50 percent).

A stand with high balsam fir representation should be cut more conservatively than one with a high red or white spruce component. Stands in which the hardwood component consists largely of intolerant species, such as aspen and paper birch, should be cut more lightly than those containing admixtures of tolerant hardwoods such as beech and sugar maple, which are known to be fairly windfirm.

Greatest danger from windfall is encountered in the spruce-fir type group; hence the cutting in this group should be on the conservative side. Balsam fir in this type group, with the exception of the black spruce type, is likely to be preponderant; and the bulk of the cut, where practical, should be taken in this species. In the other two type groups, cutting an equal or greater proportion of hardwoods should be undertaken to forestall encroachment of these species.

Stand Improvement Measures

Fortunately much of the spruce-fir area at the time of the last cutting supported advance conifer reproduction, which is developing into fairly satisfactory stands of pulpwood where adequately protected from fire. In the absence of advance reproduction, however, undesirable hardwoods have taken possession of the land.

Such lands are in dire need of rehabilitation. Even where reproduction is adequate, its presence is no assurance that a satisfactory crop will develop. Such stands, if left undisturbed, produce yields far below the capacity of the land. Stand-improvement measures are needed to relieve spruce-fir reproduction from serious hardwood competition; failing areas must be brought into production. Measures must be applied that will improve both the growth rate and quality of the incoming stand.

The development of residual stands, reproduction, and planted stock in the spruce region is often made difficult by the competing effects of unwanted trees. This competition assumes two distinct forms: (1) young hardwoods that spring up on cut-over areas and burns and through rapid height growth smother or overtop the slower-growing conifers; and (2) an overhead canopy of relict trees or an overstory of younger hardwoods. The crowns of such trees through dense shade and mechanical interference retard the growth of the desirable elements in the stand.

Weedings

The most practical way to prevent competing young hardwoods from choking out newly established conifers is to undertake weedings in which the undesirable species are killed or cut back. The time and frequency of weeding operations vary among the major type groups.

In the spruce-fir type group where weed species consist of light-foliaged intolerant species such as aspen and paper birch, softwood reproduction maintains itself fairly well. Early weedings are not required nor is there generally need for more than one weeding.

In the spruce-fir-hardwood type group where hardwoods are somewhat more aggressive, one weeding 8 years after logging will usually suffice to place softwoods in possession of the area.

In the hardwoods-spruce-fir type group, because of the extremely favorable conditions for hardwood growth, two or even three weedings spaced at 4- to 5-year intervals may be necessary to give ultimate dominance to the softwoods.

In all sites, however, the relative heights of the crop and weed trees must be considered. If the

advance reproduction on the easily reproduced sites at the time of cutting averages 1 foot in height, it will often gain dominance without weeding. On the medium and difficulty reproduced sites the heights should average 2 and 4 feet respectively. As long as most of the conifers are putting on height growth averaging 6 inches or more per year there is no urgent need for weeding.

Girdling, Poisoning, and Felling

Several effective methods and variations have been developed to release understory conifers and giving them the opportunity for increased growth. The most commonly used are girdling, poisoning, and felling.

Discretion must be used in applying these measures. No money should be spent on destroying trees that do not suppress advance reproduction or whose crowns show evidence of deterioration. The measure should be used selectively, eliminating only trees of poor form and quality. When applied to younger, more thrifty hardwoods they should be limited to areas where the prospect for a profitable future market for the class of hardwoods in question is definitely remote.

Thinning

Thinning as an effective measure for increasing the yield and quality of spruce-fir stands deserves serious consideration, particularly on properties containing appreciable areas of even-aged second growth. The excessive competition that develops in such stands as they grow older necessitates thinning if a satisfactory growth rate is to be maintained.

Studies indicate that good results are obtained by thinnings that remove 20 to 25 percent of the stand at intervals of about 10 years. Seldom should the basal area of the stand be reduced below 100 square feet per acre—particularly when this involves removal of more than 35 percent of the stand. A safe residual basal-area range is from 100 to 150 square feet per acre.

Pruning

Pruning has as its objective the production of high-grade sawlogs or veneer stock at reasonable cost. Saw-timber production, or its integration with pulpwood production, already obtains in portions of the spruce-fir region. Pruning for quality production under such conditions appears fully justified.

When pruning is properly applied there need be little or no reduction in growth rate. Only straight-boled, vigorous trees, free of injury or disease, and whose position in the stand gives reasonable assurance of their development into crop trees, should be pruned.

As a rule pruning should be confined to trees not more than 4 or 5 inches d.b.h. Normally 150 fast-growing dominant or co-dominant trees per acre should be pruned. Rapid growth of pruned trees can be maintained through frequent thinnings aimed at freeing and encouraging the development of large crowns.

Planting

Cutting methods are aimed to achieve adequate restocking. Instances occur where regeneration fails to materialize. Sometimes fire, destructive logging, or other factors account for the absence of adequate reproduction. Where such areas occur on good growing sites and regeneration is unlikely in a reasonable period, planting appears fully justified.

Protection Measures

Logging Damage

Since preservation of advance reproduction is such an important factor in the maintenance of spruce and fir, damage to the incoming stand from logging operations must be kept to a minimum.

Measures should be instituted to prevent needless swamping of young trees and saplings, length and number of skid roads should be kept to a minimum, yarding should be substituted for stump-cutting wherever practical, and necessary steps should be taken to keep slash to a reasonable density. Individually and in the aggregate these factors are potent in reducing ultimate yields; they are often the chief factors responsible for conversion of spruce sites into shrub and alder growth or into pure hardwood stands.

Slash disposal methods should aim to reduce the density of the slash to a point where it is no longer a deterrent to reproduction. The amount of slash created through logging will vary with the volume of the cut and the extent to which spruce and fir are represented in the stand. Since the three major type groups vary widely in the latter respect no uniform policy of slash disposal can be applied. The three type groups provide a useful basis for prescribing slash-disposal methods.

In the spruce-fir type groups a satisfactory slash density can usually be achieved by burning 10 to 30 percent of the slash and scattering the remainder. On areas with extremely dense slash, burning only the densest slash and that on the most hazardous areas, as along roads and railroads, should have appeal to many owners. Such a method, supplemented by fire lanes and intensive patrolling, should provide adequate protection for such cut-over lands.

In the spruce-fir-hardwood type group where spruce-fir representation exceeds 50 percent, a satisfactory slash density can usually be achieved by reducing dense slash through scattering.

In the hardwood-spruce-fir type group no slash disposal measures are necessary.

Insects and Diseases

Because of the prevalence of destructive insects and disease in much of the spruce-fir territory, management techniques must be applied that promise to build up resistance to such pests. Some of the more troublesome of these are the spruce budworm, the eastern spruce bark beetle, the European spruce saw fly, the balsam wooly aphid, and numerous butt and heart rots. Fortunately selection-cutting methods designed to attain

the normal objectives of increased growth are equally effective in building up resistance to these pests.

The repeated light cuts inherent to the selection-cutting system permit frequent removal of the highly susceptible, slow-growing, weakened, and decadent trees. But care must be exercised to retain vigorous stems in sufficient density and volume to preclude windfall and assure rapid increment. Stand resistance cannot be fully achieved in one cutting. It is a step-by-step process attained through repeated cuttings, each of which should further increase the resistance level of the stand.

Fire

Protection against fire is, of course, a prerequisite to successful timber growing. To attain effective fire protection calls for a well-trained protective organization, adequate improvements and equipment, together with well-thought-out plans for quick detection and prompt suppression.

Summary

To summarize briefly: Two questions epitomize the spruce-fir management problem: (1) How to restore spruce-fir lands that through mismanagement are now badly depleted and in a state of deterioration? and (2) How to manage existing stands at a profit and at the same time insure a level of production in keeping with the productive capacity of the land?

Attainment of these goals should be through the climax forest approach; for each climax type the composition and stand structure that characterize it should be used as silvicultural guides.

The key to the first problem—restoration of depleted and deteriorated forests — is stand-improvement measures. Foremost among these are weeding, girdling, and release cuttings designed to give spruce and balsam fir a dominant position in the final stand, supplemented where necessary by planting to maintain a high spruce-fir component and fully stocked stands.

The key to the second problem—maximum production and profitable management of existing stands—is skillful application of cutting methods that forestall the need for later costly cultural measures. Generally speaking, this goal can be most successfully attained through selection cutting. But other cutting methods may be essential first steps in the ultimate attainment of an all-aged forest.

Selection cutting assures adequate regeneration; it provides protection against windthrow; it is a deterrent to encroachment of hardwoods and brush growth; it achieves composition ratios that promote healthful, resistant stands. Moreover, it insures maintenance of thrifty growing stock capable of rapid volume increment and early harvest cuts. Such a cutting method, combined with protection measures against fire, forest pests, and excessive logging damage, should achieve timber crops in keeping with the full potential of the land.

Thirty Years of Natural Regeneration on a Douglas-Fir Cutover Area

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THE EARLY LIFE HISTORY of a Douglas-fir stand in the upper Wind River Valley in Washington is being studied to determine the progress of natural regeneration. The river bottom and lower slopes of the valley were clearcut in 1917, and the slash burned the following spring. As soon as the slash fire was out, a double line of sample plots was established across the valley from timber edge to timber edge to measure the rate of natural restocking.

The cross section of the valley represents a gentle northeast exposure, a flat river bottom, and a rather steep southwest exposure. The total distance from timber edge to timber edge is a little over a mile. The sample plots were examined annually and progress reports written. Results from 1919 through 1940 were published in 1943.[2] The present article summarizes the data through 1946 and shows the trend of restocking for various distances from the green timber edge over a 30-year period.

The northeast exposure was well stocked for 10 chains out from green timber the year after the slash fire (Table 1). By the end of 20 years this exposure was well stocked beyond the half-mile point. For the past 10 years the number of trees per acre has been declining near the timber edge. Here the stand is undergoing a natural thinning. Farther down the slope to the 48-chain point, where the stocking is poorer, the number of seedlings is still increasing. Heavy seed crops especially noticeable in 1918 and 1932 were followed by definite increases in number of seedlings.

Stocking of the river bottom and on the southwest exposure follows no such definite pattern and is unsatisfactory. Brush cover was heavy from the start. Some of the oldest trees on this understocked portion have started to produce seed, and now seedlings from this source are beginning to show up. The question now is: Will the see-

[1] Pacific N.W. Forest and Range Exp. Sta., Forest Service, U. S. Dept. Agric.

[2] Isaac, Leo A. Reproductive habits of Douglas-fir. Charles Lathrop Pack Forestry Foundation. Washington, D. C. 1943.

ondary reproduction increase the stocking enough to produce a stand and cause natural pruning of these larger trees, or will these larger trees become "wolfy" and along with the brush continue to shade out the new reproduction?

Although usually unnoticed, erosion may be a factor in Douglas-fir restocking. Eight of the 80 plots on this area have been destroyed by soil movement. In the river bottom, two plots were destroyed by the river changing its course. On the steep southwest slope, six plots were destroyed by a landslide.

A record of the total ground cover (Table 2) shows that on the northeast exposure coniferous cover is gradually increasing and the herbaceous and brush species are decreasing. The cover on the river bottom has remained about the same. Mostly hardwoods and grass have dominated the site here. A dense cover of brush developed rapidly on the southwest exposure, and brush competition has been largely responsible for the slow development of conifers on this slope.

The study shows that the rate of restocking may vary with a difference in exposure and cover even in the same general locality. The northeast exposure restocked promptly, while the river bottom and southwest exposure were no better stocked 28 years after the slash fire than they were the second year. Other factors being favorable, restocking in any one year is proportional to the previous year's seed crop and inversely proportional to the distance from the seed source (green timber)—it is a filtering-in process. If the seed supply is ample hot exposures and competing vegetation are the important factors that retard restocking, but erosion also plays a part.

About a third of a rotation has already been lost on almost half of this area because of poor restocking and there is little hope for improvement in the immediate future. The study indicates that severe sites require special treatment and that artificial reforestation may be necessary to provide prompt restocking.

TABLE 1.—SEEDLINGS PER ACRE AT 4-CHAIN INTERVALS FROM GREEN TIMBER

Chains from timber edge	1919	1923	1928	1933	1938	1942	1946
	Number of seedlings per acre						
	Northeast exposure						
2	1,120	2,720	6,000	8,430	7,920	7,120	6,560
4	1,380	5,280	5,600	6,600	6,000	3,480	3,586
8	1,013	1,493	3,040	3,927	3,891	3,518	1,758
12	240	400	1,040	1,280	1,360	1,520	1,920
16	240	320	1,120	1,680	1,440	1,040	1,520
20	320	480	880	1,200	1,040	880	960
24	160	160	320	640	640	480	480
28	160	320	960	1,920	1,920	1,760	1,920
32	80	160	240	320	560	640	1,360
36	160	160	320	480	480	480	480
40	—	—	480	640	800	1,120	1,600
44	160	320	320	480	480	480	480
48	160	800	960	960	1,760	1,440	1,440
	River bottom						
40	480	480	160	320	320	160	160
36	—	—	—	—	—	160	—
32	160	80	80	80	80	80	80
28	—	—	—	—	—	—	—
	Southwest exposure						
24	80	160	400	400	400	400	400
20	160	—	—	—	—	—	—
16	160	—	—	—	—	—	—
12	160	—	160	320	320	160	160
8	160	640	480	480	—	—	—
4	80	320	80	80	240	320	160
1	1,280	3,500	3,680	4,480	4,800	4,480	4,320

TABLE 2.—AVERAGE DENSITY IN PERCENT OF DOUGLAS-FIR AND OTHER PLANT COVER ON DIFFERENT ASPECTS[1]

Year	Northeast exposure			River bottom			Southwest exposure		
	Douglas-fir	Other	Total	Douglas-fir	Other	Total	Douglas-fir	Other	Total
1930	3	74	77	0	88	88	0	80	80
1936	22	73	95	0	92	92	2	85	87
1940	32	38	70	0	90	90	2	73	75
1946	40	31	71	0	76	76	11	63	74

[1]Density of cover is rated according to the percent of plot area shaded by Douglas-fir or other plant cover.

Site Index of Young Stands of Loblolly and Shortleaf Pines in the Piedmont Plateau Region

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METHODS HAVE BEEN DEVELOPED for estimating site quality of land for loblolly and shortleaf pines in the Piedmont region based on soil characteristics alone.[1] The soil properties that are significantly correlated with height growth are: X_1, depth of the surface soil in inches; and, X_9, imbibitional water value of the subsoil. The latter variable is the difference between the moisture equivalent and the xylene equivalent (corrected for its specific gravity to a water basis); it is highly correlated with physical properties associated with consistence and can be estimated in the field. Equations for estimating site index appropriate to the Piedmont region of North Carolina are:

$$\text{For loblolly pine: } (S.I.)_L = 100.04 - \frac{75}{X_1} - 1.39\,X_9 \qquad (1)$$

$$\text{For shortleaf pine: } (S.I.)_S = 77.32 - \frac{45}{X_1} 1.00\,X_9 \qquad (2)$$

The standard error of a single estimate is approximately 11 percent of the estimate for both equations.

Conventional methods of estimating site quality or site index involved measurement of total heights and ages of several dominant and codominant trees in a stand and the application of their mean values to site index curves for the particular species. The site index curves basic to this study are in U. S. Department of Agriculture Misc. Pub. 50.[2] They were constructed by the method developed by Bruce.[3]

Site index estimates of 110 and 120 are frequently encountered when average total heights and ages of trees in young stands (15 to 20 years old) are applied to conventional site index curves. Observations on hundreds of older stands have shown that such high site qualities do not exist on upland soils in the region. The development of the soil-site method for estimating site index has made possible a comparison of the two methods—tree-site vs. soil-site—which has led to an adjustment of existing tree-site curves for ages under 50 years.

Site index as obtained from the trees and soil-site index were compared for well-stocked, even-aged stands between 10 and 30 years of age. Both natural and planted old field stands were used. They occurred on a wide range of soil conditions. They had not been affected by fire or grazing. In addition to measurements on the stands, the soils which produced them were examined. Depth of the surface soil was measured in the field and imbibitional water values of the subsoil were determined in the laboratory. Soil-site index was then calculated by Equations 1 and 2.

A correction factor for existing site curves was required that would include the effect of age of stands on changes in the ratio of tree-site index to soil-site index. The regression used was of the following form:

$$\text{Log}_b \frac{y}{Y} = b_o + b_1 \left(\frac{1}{A}\right) + b_2 \log Y$$

where: $\frac{y}{Y}$ = correction factor to be applied to existing curves

y = site index estimated from curves
Y = site index estimated from soil

$\frac{1}{A}$ = reciprocal of age

The soil site equations (Equations 1 and 2) were based on site index at 50 years, and they were derived from stands over 30 years of age to which tree site index was assigned in the usual manner.

Since Log y = Log Y at 50 years;

then, $0 = b_o + \frac{b_1}{50} + b_2$ Log Y; and

b_2 Log $Y = -b_o - \left(\frac{b_1}{50}\right)$

The equation then becomes:

$$\text{Log}\frac{y}{Y} = b_o + b_1 \left(\frac{1}{A}\right) - b_o \frac{b_1}{50}$$

$$\text{Log}\frac{y}{Y} = b_1 \left[\frac{1}{A} - \frac{1}{50}\right]$$

Loblolly Pine

The data for loblolly pine included 69 plots which were composed of 42 plots in plantations and 27 plots in natural stands. The plantations were from 12 to 18

TABLE 1.—ANALYSIS OF VARIANCE OF THE RATIO OF TREE SITE INDEX TO SOIL SITE INDEX FOR LOBLOLLY PINE

Source of variation	Degrees of freedom	Sums of squares	Mean square
General regression	1	0.202124	0.202124[1]
Difference between regressions for planted vs. natural stands	1	0.000594	0.000594[2]
Independent of individual regressions	67	0.284154	0.004241
Total	69	0.486872	

[1]Significant at the 1 percent level.
[2]Not significant.

[1]Coile, T. S. Relation of soil characteristics to site index of loblolly and shortleaf pines in the lower Piedmont Region of North Carolina. Duke University School of Forestry Bul. 13. 1948.

[2]Misc. Pub. 50, U. S. Dept. Agric. Volume, yield, and stand tables for second-growth southern pines. Office of Forest Exp. Station, U. S. Forest Service. 1929.

[3]Bruce, Donald. A method of preparing timber yield tables. Jour. Agri. Res. 32: 543-557. 1926.

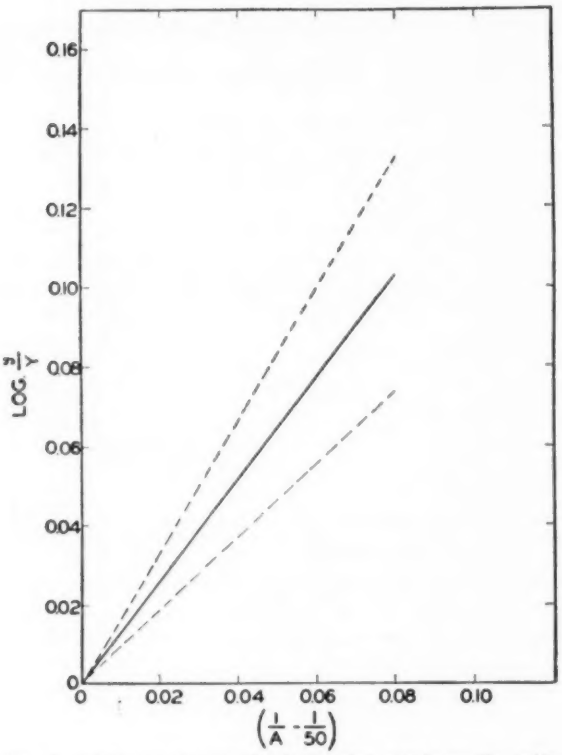

FIG. 1.—Influence of age of loblolly pine stands on the ratio of tree site index (y) to soil site index (Y) with confidence bands for a 0.95 expectancy.

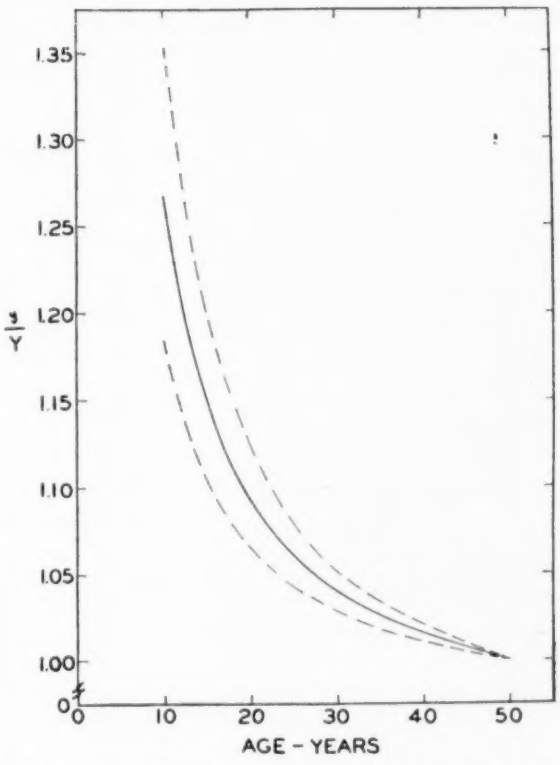

FIG. 2.—Ratio of tree site index to soil site index as a function of age for loblolly pine. Confidence bands for a 0.95 expectancy.

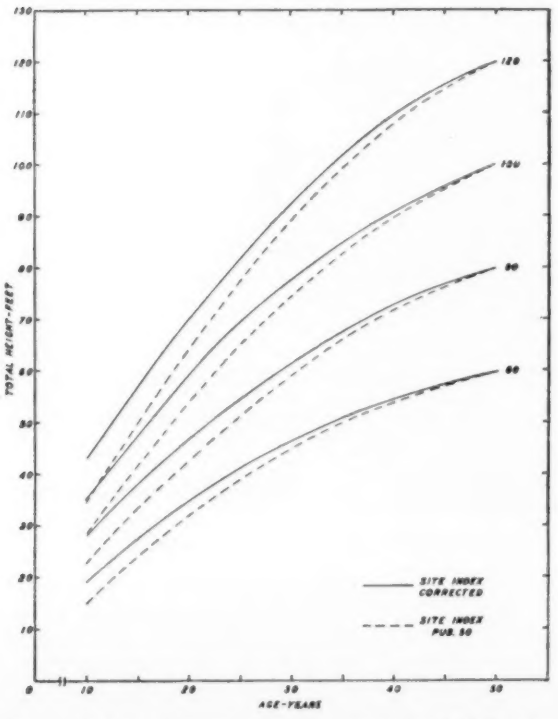

FIG. 3.—Relation between site index curves for loblolly pine from Misc. Pub. 50 and corrected curves.

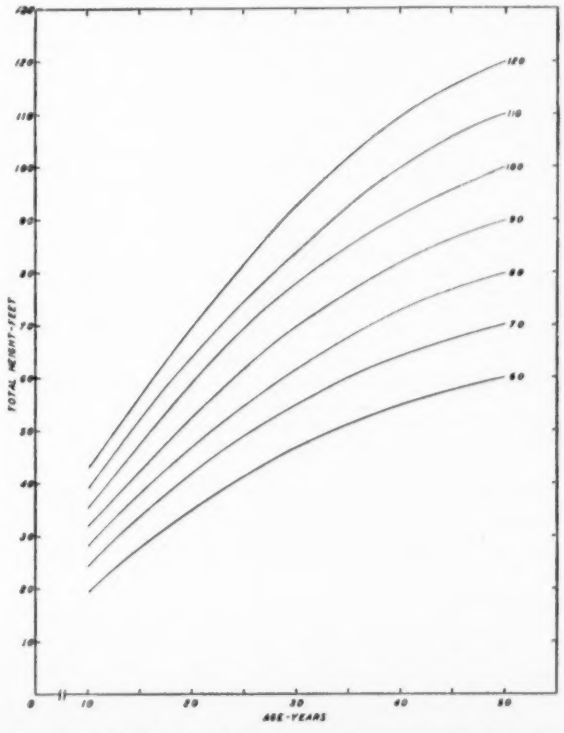

FIG. 4.—Adjusted site index curves for young loblolly pine stands.

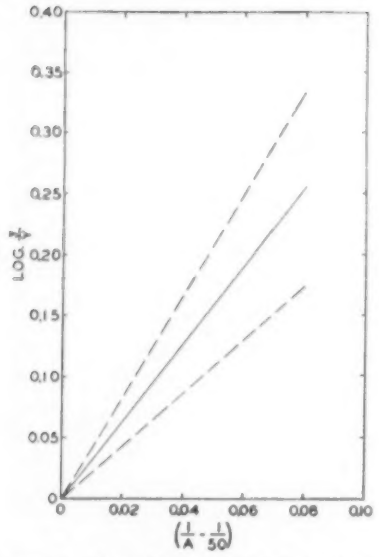

FIG. 5.—The influence of age of shortleaf pine stands on the site-index ratio with confidence bands for a 0.95 expectancy.

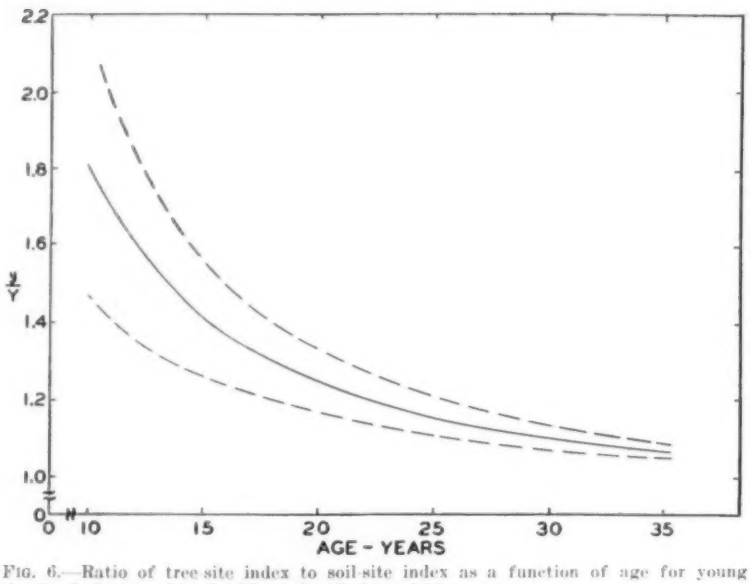

FIG. 6.—Ratio of tree-site index to soil-site index as a function of age for young shortleaf pine stands. Confidence bands for a 0.95 expectancy.

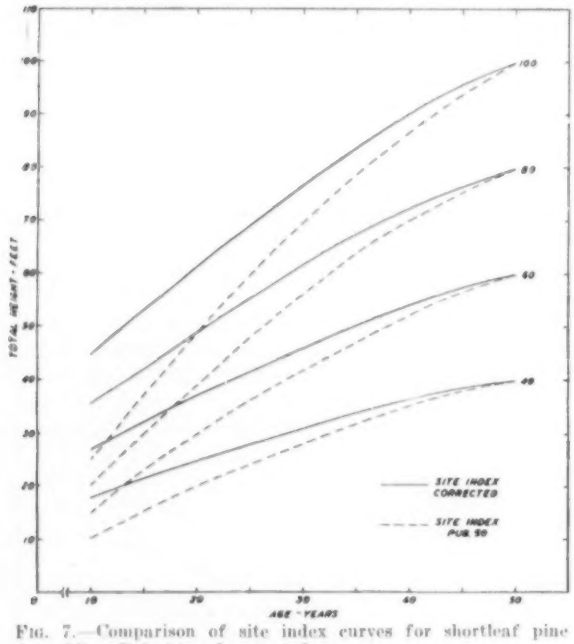

FIG. 7.—Comparison of site index curves for shortleaf pine from Misc. Pub. 50 and corrected curves.

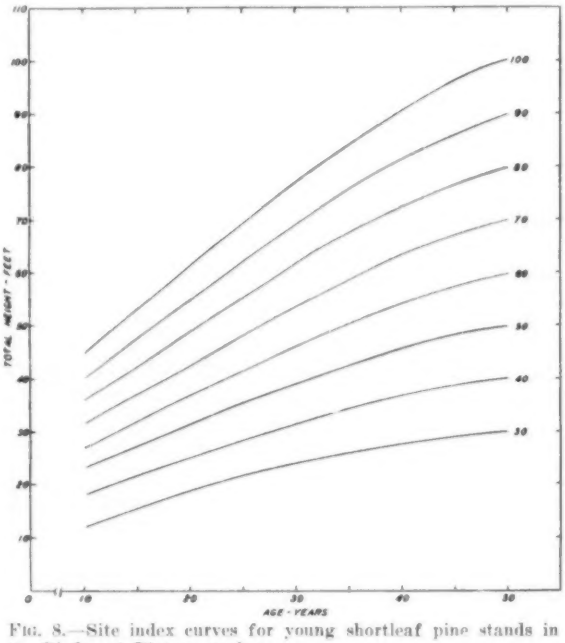

FIG. 8.—Site index curves for young shortleaf pine stands in the Piedmont Plateau region.

years of age and occurred on 11 different soil series. The age of the natural stands ranged from 11 to 26 years and they occurred on 11 different soil series.

A test was made of the difference between the planted and the natural stands. The difference was not significant, but the general regression was significant at the 1 percent level (Table 1).

The equation for the ratio of tree-site index (y) to soil-site index (Y) for loblolly pine is the following:

$$\text{Log}\frac{y}{Y} = 1.2892\left(\frac{1}{A}-0.02\right) \qquad (3)$$

the standard error of 1.2892 is 0.1867. Thus for a stand of 10 years of age,

$$\text{S.E.}\quad \text{Log}\frac{y}{Y} = (0.1-0.02)(0.1867)$$

$$= 0.0149$$

which is equivalent to 3.4 percent of the ratio y/Y at this age.

The standard error of the log of the ratio of y to Y was calculated at 5-year age intervals from 10 to 50 years. These values when multiplied by the value of t for 67 de-

grees of freedom gives the confidence bands at the 95 percent level to show the range of value of $\frac{y}{Y}$ to be expected. These data are shown in Figure 1. Figure 2 gives the ratio of y to Y arithmetically on age.

The difference between site index curves for loblolly pine as given in Misc. Pub. 50 and curves corrected by the use of Equation 3 is shown in Figure 3.

A new set of site index curves developed in this study are given in Figure 4.

Shortleaf Pine

Twenty well-stocked, even-aged young stands of shortleaf pine and their soils were examined. All were natural old-field stands and their ages ranged from 12 to 29 years. They occurred on 10 different soil series of widely different properties.[4]

[4]From Corthell, R. E. Unpublished M.F. Thesis. 1949.

Analysis of the shortleaf pine data, parallel to that of loblolly pine, provided the following equation for the ratio of tree-site index to soil-site index:

$$\text{Log}\,\frac{Y}{y} = 3.1746\left(\frac{1}{A} - 0.02\right) \quad (4)$$

The standard error of 3.1746 is 0.1497.

The range of values of y/Y for a probability of 0.95 on 19 degrees of freedom is shown in Figure 5.

The ratio of tree site index to soil site index for shortleaf pine is given in Figure 6.

Site curves at 20-foot intervals for shortleaf pine are compared in Figure 7. Figure 8 gives corrected site curves for young shortleaf pine suitable for use in the Piedmont region.

Change of Site Index with Time

Data on heights and ages obtained from periodic measurements of permanent sample plots when applied to site curves in Misc. Pub. 50 may show apparent change in site class or quality as stands grow older. Many foresters have made this observation. However, heretofore no method, independent of the conventional tree method has been available as a check. As an example of "apparent" site change, Lange[5] observed that the site index of shortleaf pine in a stand growing on Clarksville clay loam in Tennessee was 80 feet in 1938 when it was 26 years old, and 73 feet in 1949 when it was 37 years old. The average height of dominant trees was 50 feet when they were 26 years old. It is interesting to note that Figure 8 gives a site index of 73 feet for the stand in 1938 when it was 26 years old.

It is not believed that site quality of forest land changes with time independently of outside factors such as artificial drainage or other extraneous agents.

[5]Lange, K. D. Effects of clearcutting understory hardwoods on the growth of a shortleaf Virginia pine stand. Jour. Forestry 49:176-178. 1951.

Audrey Warren Completes 25 Years With S.A.F.

AUDREY WARREN

Twenty-five years ago on May 1 Audrey Warren became business manager of the Society of American Foresters. Before that time she had acquired experience in membership promotion with the American Forestry Association and circulation and advertising promotion with *Nation's Business* and *Capper's Weekly*. With this experience she brought to the Society also her enthusiasm, energy, organizing ability, and her knack of dealing with people—which is compounded of wit, directness, and consideration.

Since her first day with the Society when the membership stood at 1,350, to the present when it exceeds 9,000, she has handled such diverse duties as budgets and financial matters, seeing to many of the details of publishing the JOURNAL, developing membership files, and generally making the organization one of service to its members and one based upon sound business policies.

Many members of the Society will remember the profile which Tom Gill wrote in the May, 1946, issue of the JOURNAL, and the staff of the JOURNAL suggests that Miss Warren's many friends re-read this article, and mentally add to its delineation of her services to the Society the benefits that seven more years have brought.

Role of Science in the Professional Forestry Curriculum[1]

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University of Massachusetts, Amherst.

In discussing any aspect of the professional forestry curriculum, whether it be the role of basic science or other subject matter, we should accept a fundamental premise, namely that the forester must be more than a competent professional, he must be an educated man as well. No curriculum, or part of it, can be fairly judged on any other basis.

Education in this sense is a three-part enterprise: cultural, basic science, and professional. The well-rounded forestry curriculum should contain subject matter in the field of forestry, in basic science, and in the arts, humanities, and social studies from which is derived the broad cultural background essential to good citizenship. If the forestry curriculum fails to present this broad opportunity, both the student and the profession suffer. As teachers, our major obligation is to guard against turning out men well trained in their major occupation but otherwise poorly educated — men fitted professionally for initial employment but of insufficient breadth to qualify for advancement to positions of responsibility and leadership.

Success ordinarily requires more than mere professional knowledge and proficiency. It requires all-round breadth as well, a truism often overlooked by nearly all of us and rarely recognized by the student. Blinded by enthusiasm for his profession and by the narrow outlook of immaturity, the average student displays little interest in subject matter not of obvious direct concern to his professional field. He fails to understand that his objective should be to read, write, and speak intelligently, to think clearly, to acquire a broad background in fundamentals with which to solve problems that have no immediate textbook answers, and in general to become a good citizen. And failing to recognize this point of view, most students need sound advice and direction. In short, we must first provide a broad curriculum, and then we must encourage the student to make the most of it.

It is in the light of this basic proposition that the following comments are made.

Importance of Basic Science in the Curriculum

The generalized role of basic science in the forestry curriculum is clear when we define forestry as the application of science to the management of forest lands and to the utilization of forest products. To be sure, not all phases of forestry require a scientific background, as, for example, the economic and the mensurational sides of management. But these and similar aspects of the profession do not alone constitute forestry. Viewed in its entirety, despite certain exceptions, forestry must be regarded primarily as an applied science. In the light of this concept it follows that the student versed in basic science should make a better forester than the student who is not; and further that the soundly conceived forestry curriculum must be fortified with fundamental instruction in the pertient basic sciences. The lack of such offerings in a curriculum is not only educationally unsound but lowers its status from the professional level to that of the vocational. There is one conclusion in all this: the practice of forestry and its root in the basic sciences are inseparable, and no curriculum can be regarded as attaining acceptable professional standards unless it recognizes this relationship.

Some will argue that much which is considered sound forest practice was developed through methods of trial and error that can hardly be called scientific. It does not follow, however, that this approach is either the least difficult or the most likely to succeed. Trial and error will continue to play a prominent role in solving some of our problems, but by itself it is no substitute for procedures based on sound scientific knowledge.

The specific role of any science in the curriculum depends upon the phase of forestry to be considered. The subject is both complex and controversial, and to discuss it thoroughly in terms appropriate to all aspects of the profession would require more time than is available and more knowledge than the author possesses. Instead, the matter will be discussed as it relates to a single phase of forestry on which the author is more competent to speak, namely the role of science in the practice of silviculture.

Silvicultural management of a forest, like the growing of any other crop or the direction of any living organism, entails the manipulation of its environment so as to produce certain sought after responses in the organisms under management — in this case forest trees. In the growing of forests, two kinds or categories of knowledge are essential to the attainment of desired objectives. First, the forester must have an understanding of tree physiology in general plus knowledge of the silvical charteristics of the tree species under management. Second, he must understand the several factors of site, which in combination comprise forest environment, and which when subjected to controlled manipulation alter the environmental complex, and in consequence affect the manner in which the forest trees grow. In short, the silviculturist must know, on the one hand, how a particular tree species reacts to change in environment, and on the other, how to control environment so as to create the most favorable conditions for the accomplishment of his goal. This is no simple achievement. Techniques and procedures which succeed with one species under a particular combination of climate, soil, and topography, may

[1]Paper presented at the joint meeting, S.A.F. C.I.F., Montreal, Canada, Nov. 1952.

fail utterly with another species or in a different environmental situation. Successful silviculture requires the ability to detect differences in site, to produce differences in site, and to exploit these differences to the advantage of the crop species and the disadvantage of the weed species. Each case is a separate problem. Stereotyped techniques and rules of thumb usually fail.

If forests and trees are to be grown by any but hit or miss methods, the forest manager must be above all a good plant ecologist with a thorough knowledge of tree physiology, soil science, and geology, at least to the extent of being able to recognize land forms and understand their significance with respect to site quality. He must be reasonably familiar with entomology, pathology, and systematic botany. An introduction to meteorology is helpful, and in view of the current emphasis on tree quality and superior strains within a species a strong case can be made for instruction in elementary genetics. It is taken for granted, of course, that the science offerings will also include courses in elementary, and possibly more advanced, chemistry, in physics, zoology, and mathematics through trigonometry. Fundamentally the silviculturist should be well steeped in botany, especially ecology and physiology, and in soils and geology. These are the tools of his trade. The competent silviculturist almost literally must be a jack of all sciences. He need not be expert in all these sciences. Indeed this is hardly possible! Rather, his need is for a broad acquaintance with many sciences. From the viewpoint of the silviculturist, science unquestionably must constitute an important part of the forestry curriculum.

But forestry is more than silviculture, being a broad field with many areas of activity, and it is pertinent to ask whether science is equally important in these other aspects of the profession. In addition to the growing of forest trees, management of forest land may involve one or more of the following objectives: conservation of soil, production of water, production of wild animal crops, production of domestic animal crops, and public recreation. Without indulging in a detailed analysis of each objective, it is apparent that all, except possibly recreation, are concerned with the land, the plant and animal life which it supports, and the several other components that comprise forest environment. In each case also, management objectives are attained primarily through the control and regulation of this environment, embracing to a large extent the same factors, the same physical materials, and the same general mode of attack as the growing of forest crops. It appears then that whatever the purpose of forest land management, the methods are similar in each instance. Forest management is indeed an applied science. And although nothing has been said thus far concerning forest utilization and wood technology, any person qualified to do so would have little difficulty demonstrating the importance of basic science in these fields also.

How to Increase Basic Science in the Curriculum

In the first paragraphs of this paper we saw that our objective as educators should be to turn out well rounded graduates, capable professionally, informed with respect to scientific fundamentals, and otherwise equipped to meet the responsibilities of citizenship in a reasonably cultured society. To produce this well rounded graduate requires a well rounded curriculum offering courses in the arts, and the sciences, as well as forestry. The proportion in which each of these should be represented is an important matter because there is often strong pressure, not always resisted, to add an ever increasing number of professional subjects to the curriculum at the expense of the arts and sciences. Any tendency in this direction is, in the author's opinion, a mistake. To pump our students full of forestry to the neglect of general education and a firm foundation in science is an error against which we must be ever vigilant.

To establish rigid standards in this respect would be difficult and undesirable. To do so in terms of specific courses would be all but impossible. Nor is it always an easy matter to separate science from the professional category. Nevertheless, the subject is not one to be set aside lightly, as it might well be discussed at length by some competent body such as the S.A.F.'s Committee on Accreditation. Much of value can come from such a discussion and worthwhile recommendations might well be made. The author is of the opinion that subject matter in the arts, in the basic sciences, and in professional forestry should have roughly equal representation on the curriculum.

It should be apparent to anyone in the educational field that to provide a sound and adequate basic education, and at the same time to develop the student professionally —all in four years—is no mean accomplishment. There is the ever present danger that science and the arts will be sacrificed to make way for additional courses in the professional realm. If this situation is to be avoided, careful attention must be given to the whole matter of curriculum organization, course content, and teaching efficiency. Other measures may be necessary. Some of the possibilities are considered in the following comments:

Deferment of professional training to the graduate level.—Ideally, the forester is best educated by first obtaining a bachelor's degree in science followed by graduate work in forestry. In this way maximum effort can be given not only to science but to the arts and related matters as well. By such a program a solid foundation should be assured. The careful selection of undergraduate courses with particular attention to certain phases of science affords magnificent preparation for the graduate specialization to follow. In the ideal situation the student enters graduate school with a firm grasp of the sciences fundamental to the particular aspect of forestry which he elects.

Yet as a practical matter, even this educational program is not without limitations. To begin with, the financial expense entailed is

prohibitive for the rank and file. Many students are not qualified for intensive graduate study; nor are educational facilities adequate to accommodate them in large numbers. I doubt, also, whether the financial returns anticipated after graduation justify the additional costs in the case of any but the superior student. But even for the exceptional individual capable of graduate work and who can afford it, there are obstacles. To pursue a long range plan demands forethought, detailed planning, and many decisions early in the student's educational career. We may well ask how many high school seniors are sufficiently aware of their professional preferences, or otherwise well enough informed, to initiate any such far-reaching undertaking. How many even understand that such a program has merit, and how often do guidance counselors in high school, or course-of-study advisors in college, recommend it? Meritorious as it is, the curriculum offering an undergraduate major in science followed by a graduate major in forestry is not the course of action which most students will or can pursue. For them the undergraduate curriculum must suffice.

Increasing the number of credit hours required for graduation at the undergraduate level.—It is here in the undergraduate college that the conflict between professional training and basic education becomes acute. At best, time is short and extracurricular activities often consume a disproportionate share of it. The immaturity of most students, and the need to earn money conspire still further to complicate matters. The truth is there are no grounds for expecting, or means of securing, graduate school efficiency at the undergraduate level. To impart to the student an adequate basic and professional education under these handicaps is a major challenge.

Increasing the number of credit hours required for graduation is one possibility. There are three approaches to this end: (1) Required summer camp or on-campus classes, (2) the five-year curriculum, and (3) an increase in semester credit requirements during the regular school year. The institution of required summer courses has already been exploited thoroughly by most forestry departments. To pursue this angle further would impose an unjust burden on most students who need the summer interlude for rest or employment.

The five-year curriculum has been seriously considered by many educators, and admittedly it greatly increases the effectiveness of the educational process. Whether the added expenditure of money and time is warranted in terms of financial rewards afterwards is another matter. It is debatable also whether the five-year curriculum can attract students in competition with four-year curricula in other major fields. All things considered, the five-year curriculum can hardly be regarded as a happy solution for the general run of students under present conditions of employment.

The five-year curriculum can be circumvented to some degree by increasing the semester credit requirements during the regular school year. This procedure is followed by many engineering departments organized on a four-year basis. To qualify for graduation, students in engineering commonly are required to take 20-30 percent more in course credits than students in most other major fields. That this plan places a heavy load upon the student and may seriously tax his capacity goes without saying. On the other hand it can hardly be argued that engineering is a less difficult subject than forestry, or that foresters are less able or industrious than engineers. Presumably less effective than the five-year curriculum, this intensified four-year plan tends to accomplish the same objective and does so without the addition of a fifth year.

Curtailment of the course offerings in professional forestry.—Restricting the number of forestry courses to the minimum considered essential for professional foundation is yet another means offering more time for study in the arts and sciences. I anticipate this suggestion will arouse consternation in some quarters. Yet even a casual examination of college catalogs discloses the fact that some institutions require much more of their students in the way of professional forestry than others. Some curricula, compared to others, are top-heavy in this respect. It seems possible that some curtailment of technical courses can be effected without impairing the professional curriculum in some cases, and perhaps in most. We are all prone to think that the student must graduate knowing all the answers and the student, of course, is dismayed by any other prospect. This is sheer nonsense. Our function is to teach him principles and fundamentals, not trimmings and soon-outmoded details. Our purpose should be to provide a solid foundation on which the student may grow and develop after his college career. The student's job is to absorb these fundamentals, and to develop in the fullest measure his capacity for logical reasoning and for effectively applying basic knowledge to the solution of practical problems.

By way of example, an able and well educated wildlife manager once told the author that his professional training, received at the graduate level, contained only one course of instruction bearing the title *wildlife management*. The remainder of his curriculum was concerned with related basic sciences. Admittedly this is an extreme case but it serves to illustrate a point. We might turn out better foresters in the long run if we taught less forestry and more science.

Curtailing the professional curriculum is not easy. It may mean overhauling not only the overall plan of study but perhaps some of the courses as well. It requires careful examination of the entire program with an eye to eliminating duplicate and non-essential material. It calls for teaching efficiency of a high order, and coordination between courses with respect to subject content and order of presentation. This does not mean that every curriculum is susceptible to pruning by these or any other techniques, but it does mean that we can teach too much forestry for the good of the profession.

Greater coordination between the teaching of basic science and the professional subjects.—It seems desirable that presentation of the courses in basic science should, for the most part, precede the main body of professional instruction, a reasonable and widely accepted viewpoint. In some colleges the policy is to present, during the first two years, the basic courses of the so-called core curriculum plus background subjects allied to the student's major subject. Study in the major field itself comes largely during the later years. In a sense this approach to education—which might be called the 2-2 plan—is an attempt to introduce at the undergraduate level the same sequence of courses previously described in comments relating to graduate study—that is, basic education first and professional education afterward. This plan of curriculum arrangement has one prime disadvantage. It leaves the student somewhat rudderless and without direction. Having, at best, no more than a superficial impression of his chosen profession, he finds it difficult to interpret the basic science of the early years in terms of the professional courses yet to come. Failing to recognize any direct relationship, the student often devotes less attention to these background fundamentals than their importance merits, and occasionally he may even fail a course through lack of interest.

The most obvious cure for this situation is to break away from strict adherence to the 2-2 plan, at least to the extent of teaching some of the elementary forestry courses in the sophomore year. Breaking into the freshman year is even better. No radical departure from the 2-2 system is recommended, however, nor is it necessary. One course a semester during the first two years should suffice—subjects, for example, like dendrology, wood identification, and elementary mensuration. In this way, the student begins to get the "feel" of his major field, and having established definite ties with his major department he soon develops a comforting sense of "belonging." If he is intelligent and interested, and if the department in turn fulfills its responsibility in providing sound friendly guidance, the student soon ceases to drift and sets a firm course. Even under these conditions the student may not properly relate his basic science to his profession. But if nothing more, he should come to realize that such a relationship does exist, and this in itself is a healthy development.

Success in teaching depends upon many factors, and one of the most important is the manner in which a course is taught and the viewpoint of the instructor. This matter has particular significance with reference to the teaching of basic science in a professional curriculum, because, to be fully effective, the science must be presented with thoroughness and from the proper "slant." In some institutions all students, irrespective of major, are required to take a minimum number of credits in the elementary sciences. These courses commonly are included in the core curriculum as part of the program in general education which every student is expected to absorb. Such courses are often ground out in almost assembly-line fashion for a great mass of students of mixed origin and interests without regard for their major field of study. Under this mass-treatment approach, most such courses are taught with no objective more specific than to give the student a general acquaintance with the particular science concerned. Ordinarily, laboratory work is deemphasized and course content is well watered down. There is no attempt to interpret science in terms of any other field. The resulting product, while it may be satisfactory general education for majors in liberal arts or related subjects, provides a poor substitute for the working tool needed by students in agriculture, science, and engineering. It is small wonder that they lose interest and fail to see any association between what they learn and their own profession.

For foresters, science taught in this manner is science taught at its worst. The manifest need is for science courses of greater content, more laboratory work, and a more specific objective than mere general education. The need is for courses taught exclusively for foresters and with reference to their particular requirements. In this way the student obtains a better working knowledge of the subject, and if the teaching is properly done, a better insight into the relationship between it and forestry. Teaching of this high standard can be instituted most readily at institutions where forestry is organized at the school or college level. Here basic science can be taught within the school or college itself, and treated in whatever manner is appropriate. Where forestry is organized on a departmental basis, the teaching of science must be carried on outside the department, and, unless the number of forestry majors is large, separate courses presented specifically for foresters may be impossible to arrange. It should be feasible, however, to create special courses for larger groups with similar requirements, such as students in forestry and agriculture. The need for this specialized and more discriminating treatment of basic science is not equally important in all the sciences. With some it is highly desirable; with others bearing less directly on the profession, it is not.

Student Orientation

Previous remarks draw attention to the importance of assisting the student with his education. There are sound reasons for stressing this point. If proof is needed, the typical college freshman is eloquent testimony—a confused young man with only a vague notion concerning the nature of either college or forestry. There are exceptions of course, but for the rank and file, college is likely to be a bewildering and a trying experience at the outset, demanding many personal adjustments quite apart from his schooling. He has difficulty enough coping with the more obvious problems, let alone the less obvious. We cannot expect that, without assistance, he will also understand why the curriculum is set up as it is or derive the maximum benefit from it.

Unfortunately educators are prone to take a passive view of this matter. We strive for perfection at the instructional level, yet tolerate all manner of imperfection at the student level. What an incongruous situation this is! Education is a dual undertaking—a giving out of knowledge and a taking in of knowledge. And the ultimate success of the process is no greater than the least efficient part of it. As in radio, success in teaching requires a good program well transmitted and well received. Fortunately it lies within our power to develop a more effective instrument for reception. We can help our men to become better students, and we must if our efforts and theirs are to achieve maximum results.

The need is for a program of student orientation and guidance—a program of indoctrination instituted at the earliest opportunity, which will knit together all the many elements of the curriculum, a program to explain the fundamental relationship between basic science and forestry, to demonstrate the importance of general education in the cultural field, to arouse the student's curiosity, and to stimulate in him the genuine desire to ferret out answers and to think through to solutions of problems. The aim in brief should be to show the student the way, and then encourage him to take it.

Guidance of this nature can be accomplished in a number of ways, the more obvious of which are special lectures for freshmen and a carefully planned advisory system wherein students are assigned to staff advisors for counsel and general orientation. The guidance program can go beyond these expedients, however. It should be an integral part of our everyday teaching. How we teach, the problems we assign, the examinations we give, our contacts with students, all afford opportunity to coordinate, to stimulate clear thinking, to encourage, to challenge. Effective education is built around good instruction plus receptive, agile-minded students who see their goal and energetically pursue it.

Conclusion

We must keep the forestry curriculum broad, keep it fundamental, and preserve a reasonable balance between professional training and basic education in the arts and sciences.

Modification of Forest Practices in the Lake States for Wildlife Habitat Betterment[1]

Ernest Swift
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IN THE DAYS when Wisconsin belonged to the Indians, the virgin forests covering much of the northern part of the state did not have thriving populations of our now familiar forest game birds and mammals. Dense stands of tall, mature trees with little herbaceous or shrubby vegetation provided scant rations for wildlife. The relatively recent game bonanza has been the product of the young, developing forest which has sprung up following the axe and fire of the logging era. The young stage of forest succession provides forest game with a maximum supply of essentials—food and cover. But succession does not remain at a stand still. As the young forest matures and shades out the understory so vital to game, the carrying capacity of the range will decrease—and is already decreasing. Many of the forest stands in Wisconsin are even-aged as a result of early logging practices; these are closing in, but will not be harvested and "opened up" to game until they are mature. Thus we are entering a stage of lowered game productivity—the inevitable interim between young forest stages and mature harvestable timber.

Forest-Wildlife Goals

The goal toward which forest management is aiming in Wisconsin is the creation of uneven-aged stands—either intermixed, or in blocks of different age classes. This type of forest habitat will not only yield sustained crops of timber, but should also provide an insurance policy for a sustained yield of game in the future.

But what about right now?

If we are to increase our game populations—or even maintain the status quo—we must not only include wildlife considerations in our future forestry plans, but we must modify our present timber production efforts in some areas to improve wildlife habitat. Foresters, game managers, and the public alike must decide now whether we will take some positive action toward the true multiple use of our forest lands for the production of game as well as timber.

The forestry-wildlife problems on forest lands in Michigan, Minnesota, and Wisconsin are essentially the same. I am most familiar with the situation in Wisconsin and will attempt to summarize the combined efforts of foresters and game managers in showing us some of the ways in which we can make the multiple-use idea work. Although deer, ruffed grouse, rab-

[1]Paper presented at the joint meeting, S A F. C.I.F., Montreal, Canada, Nov., 1952.

bits, and squirrels are the main forest game animals concerned, most of the efforts have been directed toward the species which creates the toughest problems today—the deer. Other forest wildlife also will benefit from those measures directed specifically toward deer.

The first and perhaps most important "modification" is in our own point of view. What do we want, and where do we want to have it? Do we want primarily timber from our forests? Do we want mixed or solid stands? Should we strive for maximum game production and forego a large share of our timber production? What species of game are we going to settle for—sharp-tailed grouse which require the openings and shrubs of very early forest succession, or ruffed grouse and deer which thrive best in a slightly more advanced stage?

We cannot, of course, have everything on the same forty of land. But on our northern forest lands there are many "forties," and it is possible to produce a variety of timber crops and a variety of game species. This does not mean maximum production of either—it is not an all-or-none axiom involved. It means rather that there must be some give and take between all interests. Both timber and game must yield some—how much is a matter of degree, not principle. Both timber and wildlife production will be somewhat curtailed in a true multiple-use program, but the total results will be more valuable and more satisfying as judged by human needs than the sole consideration of one interest.

Land Classification

One approach to the solution of this immediate problem of deciding how and where we can best lay the foundation for a multiple-use program is the classification of our lands into management types. In general we need to consider the types of lands we are interested in maintaining—for example, untouched wilderness areas; areas of primary forestry value; areas where wildlife has exclusive value; areas where wildlife values are dominant over forestry; areas where wildlife values are important, but of less value than forestry interests.

An important step forward in this respect has been made on the 116,000-acre state-managed Central Wisconsin Conservation Area. Under the direction of Stanley G. DeBoer, the land has been classified into forest, wildlife, and multiple-use management areas. On the forest management lands, areas of high value for timber production, timber management is of primary importance. Game is also produced, but little or no game management work is done. On the wildlife lands, generally submarginal forestry areas, management for wildlife is the first consideration. Such lands may produce some forest products, but this is entirely incidental to the main function of creating and maintaining suitable game habitat. On the multiple-use lands, areas of diverse cover types, improvement and management work is carried on for both forestry and game. Such land-use classification better clarifies how, when, and where forest and wildlife management measures can be coordinated for the best possible yield of both timber and game.

Integrated Practices

Our main concern in this discussion is with those lands which are of importance to both forestry and wildlife interests. Forest and game management are not miles apart—radical changes are not necessary to produce good crops of both timber and game on the same lands. It will be necessary, however, in many cases, to modify our ideas of "financial maturity" and our "cash and carry" policies. Much game habitat development work can be accomplished through the coordination of various land management tools now in operation: cutting, timber stand improvement, and reforestation. Most of the existing forestry practices themselves do not need to be modified to incorporate game habitat, but the application of these practices should be adapted to game needs.

The main efforts now being carried on in Wisconsin are along the lines of experimental development. Two forest habitat development projects were created in 1951 as a part of the Pittman-Robertson program to serve as a pilot experiment. These projects are cooperating with state and federal foresters in an attempt to integrate wildlife habitat improvement with current forestry practices.

A large share of the work accomplished in the state has been done by Game Division personnel and to some extent on game lands. But it is important that we consider not only ways in which the game manager may produce game on forest lands, but also ways in which commercial forestry can aid in the improvement of wildlife habitat. This is of utmost importance if wildlife habitat improvement is to succeed on a wide scale.

Cutting is one of the most important tools for creating wildlife habitat. It provides immediately available browse for deer, temporary openings for all wildlife, and starts a new plant succession on its course. Last year in the Northern Highland State Forest alone, 12,000 cords of wood were harvested on about 3,000 acres, and in the Chequamegon National Forest, about 66,000 cords on 9,000 acres. And these figures are small compared to cuttings on private lands. A large amount of aspen was cut. When harvested in the vicinity of deer yards, aspen can be of immense importance in providing free deer browse. The next year the same site will be pushing up around 40,000 suckers per acre of sustaining browse which will be available for several years.

In a consideration of game needs on forest lands, then, we need to aim for continuous cutting. This may mean heavier cutting and shorter rotations on some areas than maximum timber production policies would dictate, and consequently lower stumpage values in some cases. Specific modifications of cutting practices which would benefit game habitat lie largely in the "where" and "when" of cutting. Frequent, small timber sales in areas adjacent to deer yards, with cutting restricted to the winter months, provide our best outlet

for deer range management. For example, vegetation in a small swamp is too slow-growing to manage from the food standpoint, but it provides the necessary cover. On the surrounding uplands it is faster-growing, and can be better manipulated to meet winter browse requirements. On the Chequamegon National Forest, the game manager initiated some small sales this past winter in hardwood uplands adjacent to deer yards. Small timber sales are frequently neglected by the foresters because of a lack of time to locate them. On areas where game is especially benefited by them, it is often possible for the game managers to locate these sales, and have the foresters proceed from there. In other areas in the north, efforts have been made to conduct frequent, small sales in the winter when food from the tops is available to the deer. When sales are limited to the winter period, however, it may be necessary to accept lower stumpage values, or to subsidize the logger in some way such as keeping logging roads open.

Thinning is a forestry practice which benefits both timber and game production, for it not only improves the growth of the stand and stimulates tree reproduction, but it provides immediately available browse. It is not ordinarily considered important enough to warrant the cost, but the values to game may in some instances tip the scales. The need for increased browse production is strikingly apparent. Sample plots in the Northern Highland State Forest showed that browse production per acre averaged about 24 pounds. A theoretical herd with a fall density of 20 to 30 deer per square mile would need, when concentrated into winter yards, in the neighborhood of 100 pounds of browse per acre to carry them through the normal critical winter period. Therefore browse production should be increased at least four times to support a herd of this size.

Cuttings of both commercial and non-commercial browse species were made this past winter on about 800 acres in various areas in northern Wisconsin in deer yards and in the adjacent uplands. Costs per acre ranged from about $5 to $15, depending on the size of the cut. When this work is done on an extensive basis it is possible to reduce costs. These thinnings were somewhat heavier than the best forestry practices would recommend, since one of the objectives is the securing of reproduction for browse. However, thrifty trees were left to provide some shade on the areas, and it is probable that forestry suffered but little. The trees were cut only two-thirds the way through the trunk and lopped over. In this way the tops remain alive for several winters, and subsequent suckers and seedling reproduction will furnish browse for eight to ten years. Deer use of the down tops ranged from light to extremely heavy. Since the Game Division controls only small areas where this type of work may be practiced, the success of the program depends largely on the cooperation of other agencies and the public.

Whereas cutting itself is one of the prime benefactors of deer habitat, the restriction of cutting of coniferous cover species within deer yards is also an important consideration. Cedar, spruce, balsam, and hemlock are of great value as cover and the cutting of these species has in some cases been limited.

Our ideal in deer management is to bring the deer herd into balance with the carrying capacity of the range. Cutting operations in general foster new growth, and, if planned as to size, placement, and time of cutting, will help to raise range carrying capacity. But here is the catch—this can be done only with deer herd control. In areas with too many deer, we might end up with raspberries instead of maple seedlings.

The management of sharp-tailed grouse, a non-forest game bird which is now confined to what is essentially a forest habitat, requires greater concessions on the part of the forester. Here again it is a matter of degree. In order to maintain sharp-tails we must yield some timber production on lands of primary "sharp-tail value," and thereby preserve some openings and brushy country. A 20,000-acre sharp-tail management area has been set up in the Chequamegon National Forest that will involve a cutting rotation around a nucleus bog opening which now holds the birds. Small sales averaging about 300 acres will be promoted at least once every three years on the area, and if possible, timber will be cut every year.

Generally speaking, open areas represent planting sites to the sawlog forester. To the wildlife technician they represent a type of habitat to be maintained, perhaps modified by planting, but not eliminated. Reforestation programs, however, are fast translating remaining openings into pine plantations. By excluding the planting machine from certain lands, particularly poor soil types, we may save some of the few remaining sharp-tailed grouse spots in the state — areas which will also favor deer, ruffed grouse, and bear as well. A few areas have already been set aside in the state to be kept free from planting.

Openings may also be maintained through the modification of current planting policies—modifications which will be of value to both the forester and the game manager. In some regions, unplanted strips are being left in the plantation proper. These will serve not only as feeding and airing spots for wildlife, but also as firebreaks. Belts of deciduous species through coniferous plantations are planned by federal foresters, and also strips of conifers through hardwood monotypes. In the central area in 1951, a two-chain strip through the middle of a pine plantation was left open for red maple planting by local sportsmen's clubs. Such areas will not be suitable in shape or acreage to manage as forest units, so may be managed primarily for game values, at the same time serving the forester with a firebreak and an interspersion of forest types.

The re-establishment of coniferous cover, on the other hand, offers about the only possibility for

increasing the use of upland areas by deer for wintering purposes. Very dense stands of conifers, at least 10 acres in size, might function effectively as winter cover areas, but the establishment of these pure stands in mixed hardwood types and near traditional deer yards will be essential.

The breaking up and disking of very poor aspen stands, which in their present condition would never produce merchantable pulp, is a practice acceptable to both forestry and game management. The use of a heavy Athens-type disk to stimulate new suckering and seeding in stands of poor quality offer excellent possibilities for increasing food and cover for game species, as well as for providing valuable reproduction for future timber crops. A total of 445 gross acres was disked in the Nicolet National Forest by the forest development project at about $3.25 per acre, including supervision. In Minnesota good results were obtained by Walter H. Petraborg and Vernon E. Gunvalson on experimental strips adjacent to a winter deer yard which were disked to determine reproduction of potential winter deer browse. Good sprouting resulted, particularly of preferred browse species. Red maple, for example, had a sprouting ratio of 22.3 to one laid down. The cost of this project was $3.87 per acre with the use of a cut-a-way disk.

Seeding of logging trails and log landings to legumes has been carried on by the forest development projects to maintain these trails and small openings for their game values as well as for access and future logging operations. Mixtures of clovers, grasses, and other legumes have been used. The cost of materials varied from $4 to $5 per mile. The plantings furnish food and also maintain the "openness" by creating competition for woody species. Flush counts have shown that these areas have been heavily used by ruffed grouse.

Many of the same principles we have been discussing for forest areas will also apply to farm woodlands. However, in these regions, the main problem facing both the forester and the game manager for the next 50 years is the protection of the farm woodlot from grazing. The elimination of the cow from the woodlot will do more now than any other single measure toward increasing the production of timber and game. Along with the attempts to solve this major problem, foresters and game managers are also striving to modify certain forestry practices for the benefit of game. Plans for timber marking are frequently altered to leave some den and nut trees standing in the southern hardwood type of timber.

The cooperation of several farmers has been obtained in scheduling cutting operations with an eye to game needs. Last winter, for example, one farmer wanted to cut some cedar from his swamp woodland. In order to alleviate food conditions in the area and to protect reproduction, the farmer cut after the deer had been concentrated in the swamp. By cutting a few posts and poles each day, or whenever he had time, he extended his cutting operations over a long period of time at the critical season for wintering deer. Here is a distinct example of a farmer who was going to do some cutting and who was willing to wait until such time as the tops would furnish some useful browse.

Conclusion

There are many other practices — such as controlled burning and impoundments — which are being carried on strictly as game management measures in forest areas. But in this discussion we have concentrated mainly upon a few of the ways in which normal forestry operations can contribute toward the improvement of wildlife habitat—particularly during this period between the young forest of yesterday and the managed, uneven-aged forest of tomorrow. Only when commercial forestry can incorporate wildlife considerations into its timber production plans (into its timber sale regulations, timber stand improvement and reforestation measures) will we be able to assemble the building blocks of a true multiple-use program on forest lands.

Our greatest challenge, however, lies in our own frame of mind—do we want to yield some immediate dollars and cents stumpage values in order to gain both timber and wildlife harvests in the long run?

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CORRECTION

In the article, "Geography of Commercially Important United States Trees," JOURNAL OF FORESTRY, April, 1953, the following corrections should be made:

Table 1, page 278: the first "x" on the line with *Pinus clausa* should be lowered one line to indicate the distribution of *Pinus contorta*. The "x" indicating the distribution of *Pinus palustris* should be moved from column two to column three.

Lines 13 and 14, column three, page 279 should read . . . . "and 24 (40.68 percent) are eastern."

Transpositions in figures in Table 2, page 279 should be corrected so that they read as follows: line one, 22—14.48 percent; line two, 32—21.05 percent; line three, 23—15.13 percent; line four, 71—46.71 percent.

Notes

Air Patrol for Better Detection and Protection in the South

During the windy, bone-dry days of last October and November when forest fires sent acreage losses skyrocketing, foresters in the South discovered a gaping hole in existing forest fire detection systems.

Steady wind velocities of 10 to 30 miles per hour shoved the fire danger rating up to class 4 and 5 and held it. Smoke and haze blanketed the entire South. Forest fire towers, requiring 10 to 15 miles visibility for efficient operation, were isolated in smoke. The net result was almost total failure in forest fire detection service.

Even when the smoke around the towers cleared for awhile, the wind blew the flames and smoke of forest fires to such an extent that it was most difficult to get an accurate "cross-out" on any fire. With nearly every agency involved in forest fire suppression stymied, the Texas Forest Service, a leader and pioneer in the use of airplanes in a forest fire fighting organization in the South, enjoyed a high level of detection service throughout the 33 day critical period (October 11 through November 13).

Fires during this period will account for a large percentage of the total forest fire dollar loss in 1952. This is true of the losses each year during days of high danger ratings and low visibility. In spite of this recognized fact, nearly all of our forest fire protection organizations are built around a system of lookout towers which is inadequate and often useless for detection during periods of high fire danger and low visibility. These are the periods when speeds of detection and suppression are most important. Valuable crew time should never be lost in chasing improperly located smokes and false alarms. (The cost of false alarms will go a long way toward paying the bill for aerial patrol.) Also, it is highly important that fire crews not be forced to wait until the tower is sure a smoke is a woods fire.

As long as we continue to operate solely under a tower detection system, satisfactory for days of class 3 fire conditions and days of good visibility but inadequate for class 4 and 5 conditions and periods of poor visibility, we must expect to pour increasing amounts of money into labor and equipment to offset this basic disadvantage.

The advantages of air detection are so evident that many agencies and companies will embark upon an extended airplane detection program in the future.

We would like to point out some of the difficulties which have been experienced, and to recommend certain procedures which may be of help to those who contemplate the inauguration of an aerial program of fire protection.

Personnel

The plane is a tool, and like all other tools, has its limitations. Its use is no panacea for forest fire control problems, yet the possibilities are great when the patrol operations of the plane are controlled by a person thoroughly familiar with the many factors which enter into fire suppression. The plane can be a key factor in a fire control organization which is vastly more efficient and also more economical than one geared solely to lookout towers.

Obviously a forester who is a pilot is in a position to render a most valuable service. The organization and execution of a fire control plan which is based upon the utilization of an airplane instead of, or in conjunction with, fire towers should be under the direction of such a man. He can quickly become oriented from the air and, being familiar with the behavior of fire, is in a position to decide which fires are likely to cause the greatest dollar loss and is able to dispatch the equipment which can most efficiently handle the various fires. In effect, he is operating an aerial fire detecting, dispatching, and organization center.

Efforts have been made to make use of pilots of the civil air patrol, the air reserve, and at times the Air Force, for fire patrol. When sent up without a competent observer, familiar with the land and with fire control, their service generally has not been very satisfactory.

It is possible to train a pilot to do an adequate job of patrolling and spotting but the dispatching job should seldom be delegated to a man who has not had actual experience in fire suppression. A great many agencies already have in their employ forester-pilots highly trained by the armed forces, and it is a simple matter to utilize this valuable skill. In other instances a slight training program warrants consideration.

The operating plans for patrolling and dispatching from a plane, if not coming from a well informed person, can severely hamstring the efforts of both plane and pilot. Pilots should be carefully coached on the many observations that can be made which will be of real service to the ground crews. The ability of a man to pilot an airplane with precision does not necessarily mean that he will make a good patrol pilot. We rate the thorough knowledge of ground forest fire control above pilot ability. A mediocre pilot with this basic knowledge can do an excellent patrolling job under any but the very worst flying conditions.

Type of Plane

The selection of the particular airplane for the job should receive careful consideration. Here are several factors which should be weighed before the final decision is made: (1) funds available; (2) other possible uses; (3) area to be covered; (4) pilot limitations; (5) quality of coverage desired; (6) quality of airport.

Generally speaking, it has been found that a fast airplane is prefer-

able to a slow one for covering a large area, since it reduces the period from take-off to fire discovery and reporting. As a rule they are more expensive, more costly to maintain, and require a higher degree of flying skill but are able to give more efficient service at less cost per acre where large areas are involved. Also, they are more comfortable, better equipped, and minimize pilot fatigue. With them it is possible to fly patrol under conditions of high winds when the lighter planes cannot operate.

In an area where the rate of fire spread is quite low, such as the Mississippi Delta, the quality of coverage need not be high and a 100 mile per hour plane will give very satisfactory protection. This same plane would be entirely inadequate on a similar acreage in the more combustible piney woods.

The formula for determining the acreage which can be satisfactorily covered by a plane of a certain speed—7,000 acres per mile an hour of airplane speed—is still thought a safe rule of thumb to apply to a "hot" area under consideration, when complete dependence is to be placed on the plane for fire detection. It is deemed necessary to be able to observe an area at least once every 30 to 45 minutes while in flight.

Altitude and Frequency of Flight

When weather will permit, a patrolling altitude of 6,000 to 9,000 feet is recommended. From this altitude it is often possible to see readily about 250,000 gross acres and to pin point a smoke location within one half mile while still at a 10-mile distance. The county or parish highway maps commonly used begin to come into sharp focus at 6,000 feet and rapid orientation is not difficult above this altitude. At lower altitudes, the plane must fly closer to the smoke in order to give a positive location and evaluation. This, of necessity, means that the plane must spend more time in the air on patrol and will be unable to observe each part of the area as often as is necessary. There is some patrolling being done at 1,500 to 2,000 feet altitude. If assistance on one or two going fires is the mission of the plane, this is a reasonable altitude. However, experience has proven that a low patrolling altitude is a handicap, so long as the visibility permits higher altitudes. Accurate, more speedy detection and dispatching, plus assistance to ground crews can best be done while patrolling at a higher altitude.

The frequency of flights should be geared generally to the visibility, the current fire danger ratings, and the forest fuel. A study of fire occurrences by hours during the day or night, by fire danger rated days (2-3-4-5), should be made. The study should go farther and attempt to establish an actual dollar loss per acre for the fires which occur at various hours of the day during various rated fire danger periods and different visibilities.

For example: Suppose that a study shows that in a particular area of 100,000 acres, 10,000 acres were burned in one year. A breakdown on acreage loss is as follows:

7,500 acres of all acreage burned by fires which occurred on class 4 and 5 fire days,

2,300 acres of acreage burned caused by fires which occurred on class 3 days,

200 acres of acreage burned occurred on class 1 and 2 days.

Obviously, this calls for more intensive patrols on the high fire danger days. A comparison of dollar loss is as follows:

Of the 7,500 acres burned on class 4 and 5 days, headfires caused serious damage to timber up to 60 feet in height. The dollar loss here is high—$50 per acre is not an unreasonable figure. The loss in this instance amounts to $375,000.

The 2,300 acres burned on class 3 days were damaged less severely. (Let us assume a damage figure of $15 per acre in this instance.) This loss amounts to $24,500.

The 200 acres burned on class 2 days were hardly damaged. We will assume a loss of $3.00 per acre in this instance. This loss amounts to $600.

Thus we see that the total dollar loss in this instance was $400,100.

Therefore, we find that:

1. Ninety-three percent of the total dollar loss occurred on class 4 and 5 fire days.

2. There were a total of 37 such days recorded in this area for the entire year.

3. Twenty-three of these days occurred during the months of February and March.

(These figures may be high for underdeveloped pine or hardwood land or low for the more fully stocked loblolly pine acres. The pattern of loss, however, we feel is typical for the southern states as a whole.)

This establishes the need for more intensive protection during high fire danger periods. Now, what about the time of day for patrols? Checking further, we find that:

1. On class 3 days the earliest reported fire was at 11 a.m., the latest at 2:30 p.m.

2. On class 4 days the earliest fire reported started at 9:15 a.m. with new fires being reported through 3:30 p.m.

3. On class 5 days the earliest fire reported started at 7:00 a.m. with new fires being reported through 5:30 p.m.

Once this study has been completed, it is then possible to work out a patrol schedule which will give maximum insurance against loss for the lowest possible cost. Obviously, the patrol days will vary from one short hop around the area to days of practically continuous flying from dawn until dark. However, there are generally not very many of these long days during a fire season. This approach, as logical as it appears, has seldom been made to the problem to our knowledge.

Conclusion

We believe that those contemplating using the aerial patrol system would benefit by observing the below listed points:

1. Consider making a pilot of your forester.

2. Solicit advice from forester-pilots who have had experience in the field before making plans.

3. To get the most for your money, employ a man who understands the problems of forest fire suppression to do the dispatching and reporting from the plane.

4. Obtain the type of airplane which best suits your individual needs.

5. Use the plane primarily for

speedy fire detection. Assistance to ground crews on going fires should be a secondary responsibility.

6. Fly at altitudes above 6,000 feet whenever possible.

7. Plan and schedule time and frequency of flights to coincide with local fire conditions and fire damage ratings.

Many progressive and revolutionary measures have been taken to strengthen our forest fire protection organizations in recent years. The telephone has yielded to the radio, hand tools and men on foot have yielded to tractor and plow units. Yet the basic service upon which all efforts depend, fire detection, remains little changed. The traditional measures of effectiveness of a fire control program is still the percentage of the total protected acreage which burns over. The total dollar loss we feel, should be, and should always have been the measure of effectiveness of any forest fire control program. The greatest dollar loss occurs during periods of low visibility and on class 4 and 5 fire days when the tower detection sytem is most limited. Foresters and persons in positions of responsibility in forest fire control organizations should explore thoroughly the possibilities and actualities of aerial fire patrol in order to give the land owners and the public the better protection that the high forest values deserve.

The system of airplane detection is designed to give adequate protection during times of greatest probable dollar loss, which should always be the objective. The airplane used for this purpose is no longer to be considered the "Cadillac" approach to the problem. It has been proved to be the most inexpensive method available. It is no longer a question of whether we can afford it. The question is "Can we afford to be without it?"

This is a challenge to state, federal, and industrial foresters.

JOHN TYLER and
C. H. LEWIS,
International Paper Company and Crosby Chemicals Inc., respectively.

Natural Occurrence of Baldcypress on Theodore Roosevelt Island, Washington, D. C.

Baldcypress, *Taxodium distichum* (L.) Rich., is a deciduous conifer that is confined to a narrow belt along the East Coast of the United States from Delaware to Florida and some river valleys of the South Central States, west to Texas. This tree species has not been reported to occur naturally in the Washington, D. C. area. In 1949, however, Dr. E. H. Walker, botanist of the Smithsonian Institution, told the writer that he had heard of a young baldcypress tree growing on Theodore Roosevelt Island. This island is located in the Potomac River between Memorial and Key Bridges of Washington, D. C., and is a part of the National Capital Parks. The island has a rich native flora of trees, shrubs and herbaceous plants. National Capital Parks records show that no trees or seeds of baldcypress have been planted on Theodore Roosevelt Island. Naturalists of the National Capital Parks, however, reported that for the past several years they had known of several young baldcypress trees growing there.

On October 26, 1950, Evan Haynes, naturalist of the National Capital Parks, and the writer visited Theodore Roosevelt Island and made a preliminary survey for baldcypress. In this survey 26 young trees of this species were noted growing in a tidal marsh at the south end of the island.

In February 1952, the writer, assisted by George Outlaw and Jack Riley, tree surgeons of the National Capital Parks, made a complete survey for baldcypress on Theodore Roosevelt Island. A total of 60 baldcypress trees were found in this survey. Sixteen trees ranging from 7 to 12 feet in height were dead. The death of these trees apparently was due to excessive shading from competing hardwood trees. The 44 living trees had trunk diameters ranging from 2¼ to 14 inches at the base and 1½ to 5¾ inches at breast height. Their heights varied from 7½ to 35 feet. Twenty of these trees were 20 feet or more in height. Increment borings were taken from 13 trees of different sizes, growing under various conditions in the marsh. The age of these trees was determined to be as follows: 3, 18 years; 5, 20 years; 4, 25 years; and 1, 26 years. As a group these trees have averaged almost a foot of growth each year, which appears very satisfactory under natural competitive conditions, and indicates these trees (Fig. 1) are growing in a highly favorable environment. Cypress knees up to 7 inches high were noted developing on the roots of some of these trees.

Although baldcypress occurs naturally only in swamps, marshes and wet bottom lands, it grows better when transferred from its native habitat to well-drained soil. Natural regeneration of the species is restricted to semi-aquatic conditions, since the seed will germinate only when in prolonged contact with wet soil, but not covered by water. The seed, however, will tolerate submersion for 30 or more months, and then germinate if the water drains off. Young seedlings are not very tolerant of surface water the first year; many of them die, particularly if the water rises above their crowns. Established trees are very tolerant of surface water if their crowns do not become submerged.

Baldcypress has been planted and grown very successfully as an ornamental in the National Capital Parks, Washington, D. C. The nearest authentic natural stand of baldcypress to Washington is in a swamp near Prince Frederick, Maryland, about 55 miles south-

Photo National Park Service

FIG. 1.—Baldcypress trees found on Theodore Roosevelt Island, District of Columbia.

Photo U. S. Geological Survey

FIG. 2.—Fossil Baldcypress stump unearthed in building excavation in 1922 at Conn. Ave. and DeSales St., N.W., Washington, D. C.

east. In Pleistocene times, however, the species was more widely distributed in eastern North America than now. The oldest reliable fossils of baldcypress are of Pleistocene Age and were found in Washington, D. C. in August 1922. This fossil material was revealed during the excavation at Connecticut Avenue and DeSales Street, N.W., for the building site of the New Walker Hotel, later renamed the Mayflower Hotel. Excellent baldcypress fossils, including huge stumps (Fig. 2) up to 8 feet in diameter, together with seeds and cone scales, were found 20 to 30 feet below the surface, in a Pleistocene swamp bed, estimated to be 100,000 or more years old.

Since neither seeds nor trees of baldcypress had been planted on Theodore Roosevelt Island, we can assume that the trees became established there naturally, from seed. About a dozen or more large trees of the species are growing under cultivation in Washington, within several miles of Theodore Roosevelt Island. It seems likely that the seeds came from some of these trees rather than from more distant sources. Water is the most important means of natural dissemination of baldcypress seeds. Some seed produced from baldcypress trees in Washington undoubtedly is washed by sewers and Rock Creek into the Potomac River. It is likely that some of this seed could readily reach Theodore Roosevelt Island through these channels. Among the older planted baldcypress trees in Washington are two large trees in Rock Creek Park, near Pierce Mill, determined by increment bore samples to be about 120 years old. These trees are growing in an open area on well-drained land within about 150 feet of Rock Creek, which empties into the Potomac River about two miles away, one-quarter mile opposite the upper end of Theodore Roosevelt Island, and about one-half mile upstream from the inlet to the tidal marsh at the south of this island. The current in the Potomac River is normally very sluggish in the vicinity of Theodore Roosevelt Island and is greatly affected by tide, which causes upstream currents when it is rising. Seed washed into the Potomac River from Rock Creek therefore would appear to have ample opportunity of reaching the tidal marsh at the south end of Theodore Roosevelt Island.

The disappearance of baldcypress from the Washington area 100,000 or more years ago probably occurred during one of the glacial periods of the Pleistocene epoch. The recent natural occurrence of the species on Theodore Roosevelt Island is an indication that climatical conditions are again favorable for the regeneration of baldcypress in the Washington area, and reestablishes the species again as part of the natural flora for the area.

HORACE V. WESTER,
National Park Service,
National Capital Parks,
Washington, D. C.

Editor's Note.—The subject of this note is covered in more detail by the author in an article in the May-August issue of *The Atlantic Naturalist.*

Points of View

An Open Letter to the Secretary of Agriculture

March 10, 1953

The Secretary of Agriculture,
Washington 25, D. C.

Dear Mr. Secretary:

Their sponsors have told me of two proposals recently made to you relating to the national forests, which seem to me to have potentialities gravely contrary to the public interest. These proposals are contained in a resolution of the directors of the American Forestry Association, passed January 30, 1953, and the plan suggested by a delegation of timbermen which is recapitulated in W. B. Greeley's letter to you of January 28, 1953.

I write you as a retired member of the Forest Service of the Department of Agriculture who is still devoting much of his time to furthering forest conservation. I was in the Forest Service nearly forty-four years; the last sixteen years in charge of the administration of the national forests.

American Forestry Association Proposal.—This resolution, in brief, suggests a state-by-state study of the boundaries of the national forests "to guide the future course of the department in respect to national forest additions or eliminations."

The resolution implies that it is in accordance with the "Program for American Forestry" adopted by the association in 1946. This is not so. At that time, following the American Forest Congress, called by the association, the directors specifically rejected proposed planks for the program which contained provisions for disposing of national forest lands. Thus, by the concluding two words of their resolution of January 30, "or eliminations," the directors adopted a position which had previously been specifically rejected by the association. I judge this was inadvertent, not deliberate; that the directors did not foresee the dangers inherent in their action.

Timber Group Proposal. — This is similar in purpose to the proposal of the American Forestry Association. It advises the appointment by you of a commission in each state to "study the desirable pattern of land ownership under the specific conditions in that State. . ." and to recommend to you a policy "in respect to the acquisition of forest lands under any existing laws, the disposition of areas now within national forests. . . ."

As you no doubt know, various groups and individuals are demanding that the federal lands should be turned over wholly or in part to the states or private owners. It may well be wise for the department to meet this attack head on by initiating its own study to determine whether any further federal acquisition is needed and if so, where and how much. Such an undertaking could be quite constructive if conducted by men who put the public interest first.

It is one thing, however, to study the need for adding to the national forests and quite another thing to consider disposing of national forest land either to the states or to private landowners.

To put disposal proposals in proper perspective it is important to consider their background. Here are a few indicators of the scope of such "disposal" as viewed by those now associated directly or indirectly with present proposals:

1. In 1946 the American Forestry Association directors were asked by certain members of an association committee to approve a suggested principle that "ownership of recaptured forest lands should remain fluid, where conditions are favorable for eventual movement into private hands; public ownership whether state or federal, should be of a custodial nature, subject to later relinquishment." The directors rejected the proposal.

2. In 1947 Corydon Wagner, chairman of the Joint Committee on Forest Conservation of the West Coast Lumbermen's Association, made the following proposal:

> Quality and accessibility are precisely the factors which should determine the kind of ownership. Desert land is of no use for farming and remains in public ownership because no individual will occupy it and pay taxes on it. The same may be true of low grade forest land. It has some use for grazing or recreation, and therefore has public value. It requires protection, and so it should remain in public custody. In the Douglas-fir region this public forest land might include most Site quality IV and V lands. Accessible Site III and better lands should be retained in responsible private ownership and public policy should be directed to this end. . . . As soon as conditions permit, the better and more accessible forest lands should go back onto the taxroll.

If any such plan for the Douglas-fir region were adopted, it would logically follow in other regions.

3. In 1952 Walter Johnson, president of the Western Pine Association, suggested "an act of Congress which would require that Government timberlands be made available for purchase at fair prices by producers of lumber who needed them for their forestry operations." He would require the purchaser to practice good forestry on the land, failing which it would be taken over by the state (though originally federal land) and resold to a second operator who would agree to handle it properly.

The significance of these examples lies in their consistency as evidence that no mere whittling of corners of the national forests here and there is contemplated. On the contrary, any such disposal plan would simply gut the national forests, eliminate the bulk of their most productive lands, wreck many operating working circles, endanger dependent operators (especially the little fellows) and dependent com-

munities, and leave the national forests with the "rims and remnants."

Both the American Forestry Association and Greeley's group disavow any thought of dismembering the national forests. What they do not seem to realize is that any study which appears to contemplate even limited disposal would offer a focal point for many powerful pressures which envision a program on a grand scale such as outlined in the foregoing quotations.

Congressional appropriation committees have evidenced a strong and favorable interest in the fact that revenues from the national forests now exceed expenditures. Certainly it would be extremely difficult to obtain appropriations adequate to protect and manage the remaining areas if the greater part of the best revenue-producing lands were thrown out of the national forests.

One highly important fact needs to be kept in mind. National forest lands are managed on the multiple-use principle so as to realize all the various benefits — water yields, timber production, production of wildlife, recreation and grazing. Private ownership has mostly a single purpose—to produce timber. The public gets much greater total benefit from multiple-use management.

Greeley's letter speaks of adding lands to the tax base. I will wager that the 25 percent of gross national forest revenues which is paid to the states in which the national forests lie is often as much or more than the taxes these lands would produce in private ownership.

After all, the national forests contain less than 20 percent of the nation's commercial forest land; private owners hold over 70 percent, most of which is very poorly handled. There is plenty for private ownership to accomplish on the land it now controls without grabbing for Uncle Sam's acres.

My recommendation is, then, that you consider the advisability and possibility of an objective study by a national commission of the need for further national forest acquisition, but with no mandate or authority to consider disposal. Any minor relinquishment of national forest lands to further mutual consolidation of holdings can be accomplished with either states or private owners under the general national forest exchange act of 1922.

It is imperative that such a study be by a national commission, not a separate one for each state as the timbermen proposed. The latter plan would almost certainly result in your receiving a hodge-podge of recommendations, with no consistency between states. The national forests are truly national in purpose and value; not of sole concern to the individual states in which they are found.

Finally, I feel certain that a constructive study would be approved and supported by conservation forces, but one contemplating disposal would stir up widespread and vigorous opposition. I am sure you have seen some of the editorials from both eastern and western papers which attest this. The Republican Party brought the national forests into being and has fostered them. I can't believe they would want to be associated with any program of dismemberment of these great national institutions.

Sincerely yours,

C. M. GRANGER,
Bethesda, Md.

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Reviews

The Small Timber Owner and His Federal Income Tax.

By Ellis T. Williams. 55 pp. Agriculture Handbook No. 52. Superintendent of Documents, Washington 25, D. C. 1953. 20 cents.

It is unfortunate, both for the timber owner and for the community, if timberlands are not fully utilized for production of forest products because of a mistaken belief that the proceeds will be largely taxed away. It is equally unfortunate if owners fail to protect, maintain, and improve their timber property because of lack of understanding of how to treat the expense for income tax purposes.

Here is a booklet on misconceptions of the federal income tax as it affects forest operations, that packs a wallop far out of proportion to its size, and in plain language. The clear understanding of income tax procedures obtainable from this publication can financially benefit the forest-owning taxpayer twice; first, by possibly saving him money now, and, second, by laying a foundation for larger income from his property in future years. And it must be all right, because the booklet was reviewed and approved by the Bureau of Internal Revenue prior to publication.

The author treats the subject matter in three main sections. The first section covers the treatment of receipts from the sale of timber and forest products, including those which are, under the law, capital gains. The second section describes the conditions under which, and the methods by which the owner or operator can claim credit in his tax return for losses from fire, windstorm, or other casualty. The third section deals with money paid out for operating or capital expenditures. Operating costs are deductible from current income. Capital outlays can pave the way for credits in future years for depletion and depreciation.

There is a concluding section in which questions on specific examples are answered and six sample cases are discussed in detail. The appendix shows samples of income tax forms, taxpayers' statements, and income tax information obtainable from the Bureau of Internal Revenue.

This booklet intentionally avoids the complexities of the income taxes of corporations and other large owners. It does not try to deal with the federal income tax situation as a whole. But if you are owner of a small timber property, or if you have to do with the income taxes of such owners, get a copy and be helped, particularly with respect to capital gains angles. Careful study of it may well justify the time required. Even if you are already an expert you will find this little volume a handy reference.

H. B. Shepard,
Federal Reserve Bank of Boston

The Tropical Rain Forest

By. P. W. Richards. 450 pp. Illus. Cambridge University Press, New York. 1952. $12.50.

In this book, Dr. Richards has taken on the staggering task of assembling a comprehensive ecological description of the lowland humid forests of the tropics. I say "staggering task" because of the immense area involved, which encircles the globe, the presence of several distinct biogeographical areas which requires working with almost wholly distinct floristic compositions in different parts of the world, and above all, the inherent complexity of the forests themselves, where an abundance of heat and moisture gives the arboreal vegetation free rein for optimum expression. None has attempted a general description of these forests since Schimper described them less intensively in his *Plant Geography* at the end of the last century.

To do this, Richards has drawn on his own personal experience of about two years in the field, divided between three different continents, study of an extensive bibliography from widely scattered sources, and personal correspondence with forest officers and other technicians working in the tropics. The list of nearly 500 references alone will be very helpful to ecologists interested in the tropics, but the greatest contribution of the book is to bring together in one volume the experience and results of research of a great many widely separated workers so that anyone interested in the tropical humid forests may find a synthesis of most of the existing information in one source.

The book is divided into six parts which cover essentially the subjects of any plant ecology book, but with specific reference to the humid tropics.

"Structure and Physiognomy" comprises four chapters covering the aspect and stratification of the forests, regeneration, the physiognomy of the trees, shrubs, herbs, and other components of the forest. This part gives an excellent description of the appearance and components of the tropical humid forests and should be of general interest to all who wish to obtain a clear picture of such forests. Of special interest are the discussions of such characters as butteressed roots and cauliflory which are peculiar to the tropical forests.

"The Environment" consists also of four chapters covering climate in general, the microclimate within the forest, seasonal changes and soil conditions.

"Floristic Composition of Climax Communities" discusses in two chapters the amazing complexity of species, the difficulties of their identification and compares the composition and structure of sample forest communities on three continents.

"Primary Successions" gives an excellent review of the much studied recolonization of the Island

of Krakatau by vegetation along with two other chapters covering aquatic and swamp vegetation and the coastal successions of both sandy beaches and mangrove swamps.

"Tropical Rain Forest under Limiting Condition" in two chapters discussed the boundaries of the rain forest with the drier tropical formations as well as its altitudinal and latitudinal limits.

"Man and the Tropical Rain Forest" considers the prime biotic factor "man" and his effect on the natural vegetation.

In addition to these parts there is an introduction giving a general picture of the tropical rain forest, its biological spectrum, discussion of the past and present distribution, with one world map, and interesting notes on the significance of the rain forest for ecology. He finishes the book with a posteript, "The Future of the Tropical Rain Forest," calling attention to the importance of the forest as a genetical store house of material which has been only partly explored and stressed and importance of preserving adequate representative samples for the future.

With all due respect to Dr. Richards for the marvellous work he has performed in putting together this material in an interesting and informative manner, it would appear that he has supported very little his introductory statement that ecologists should look to the tropics for the discovery of the guiding principles in that science. Although I am quite in agreement with his statement, his book gives the impression of a vegetation so extremely complex that there is little hope of finding an easy means of grasping the principles involved in its composition. In the first place, he has attempted to treat as one subject a forest area which is extremely heterogeneous and by attempting to place this all within one climatic province has taken on a formidable task. This would be like treating all the forests of the eastern United States plus the wet coastal forests of the northwest as one unit and trying to describe them as a more or less homogeneous unit. The reviewer believes that Richards is including six distinct climatic divisions within his tropical rain forest. Especially weak are his discussions of the altitudinal distribution of forests, probably because of the lack of personal experience in such areas.

Then too, he has handicapped himself by clinging to the old concept of dividing vegetation into both climatic and edaphic formations which cannot be compared in any logical way. He comes close to the truth in his comparisons of communities across the globe, but apparently hesitates to break with tradition. To appraise and compare these forests, one must consider the association as determined by edaphic conditions which give rise to a distinctive physiognomy within a climatic formation or life zone. Physiognomy should be the mark of the association and not of the formation. The confusion of past ecology of tying physiognomy to the formation, just because physiognomy could be correllated with climate on zonal soils, has been a severe handicap to ecology in all regions. By defining the association by its soil conditions and physiognomy, we can eliminate much of the taxonomic drudgery of ecological studies in the tropics. The principal trees may still be used for local identification of the association but cross-world comparisons will not require acquaintance with the species.

Richards' notes on the significance of the number of species in the associations or communities are interesting. We find here in Central America that this gives us an excellent tool for indicating special edaphic conditions. However, this is useful in a much broader application as in determining whether or not an altitudinal change is a climatic formation line.

These comments are not meant to be derogatory, as Richards has still accomplished his purpose of assembling and bringing up to date the existing knowledge of the humid tropical forests. This is a book which should be required reading for all working in tropical areas as well as others not so directly concerned, but who wish to know vicariously the humid tropical forests.

The book is well illustrated with photographs and profile diagrams of various forests and is remarkably free from all but a few typographical errors. The writer believes that Richards has turned out a highly complementary piece of literature which will be a standard reference for many years and should constitute a real stimulus to additional ecological research in the tropics.

L. R. HOLDRIDGE,
Inter-American Institute of Agricultural Sciences, Turrialba, Costa Rica.

Common Forest Trees of North Carolina.

Prepared by J. S. Holmes. 88 pp. Illus. North Carolina Dept. Conservation and Development, Raleigh. 1953. 10 cents.

First published in 1922, this pocket manual has gone through five previous editions with a total of 40,000 copies distributed to schools. This, the sixth edition, comprises 10,000 copies.

J. H. Holmes, former state forester (1916-1945) was the originator of the book. The present issue contains nontechnical descriptions of 74 species. It should be as popular as previous editions.

Well prepared books of this nature are decidedly worthwhile in introducing school children to the trees of their state. Moreover, from such first contacts students frequently develop interests in forests and forestry. North Carolina is to be commended for making the manual available, especially at such a reasonable price.

Dry Rot and Other Timber Troubles.

By W. P. K. Findlay, 267 pp. Illus. Hutchinson & Co., Ltd., Stratford Place, W 1, London, 1953. 25 shillings.

This book is written in nontechnical language and, while his chief

concern appears to be for the layman rather than for the technical expert, the author has brought together a great deal of highly valuable information and has presented it in a readable manner. He calls attention to the fact that losses in recent years have been far greater than before the war, owing to war damage and general neglect of buildings. He stresses the necessity for accurate diagnosis of the cause of deterioration before remedial measures are undertaken, for it is important to distinguish between insect attack and fungal decay because the type of treatment will be different.

The greater part of the book is devoted to a rather full discussion of the nature of wood, the causes and effects of deterioration and decay in timber, and the destruction of wood by insects. The importance of prevention of additional damage and the need for correction of structural defects and weakness are strongly emphasized. Measures for prevention and control of damage are dealt with in some detail; the use of the newer insecticidal treatments could have been discussed a little more fully, but from the layman's point of view this probably was not considered necessary.

Some attention is paid to defects in standing trees and to the care of timber after felling. It is pointed out that the quality and strength of any wood are greatly influenced by the conditions under which the original tree developed or by the manner in which the finished product was seasoned, stored, or utilized. The value of "antiseptic" treatments and kiln drying to prevent or inhibit fungal and insect damage in logs and manufactured lumber cannot be overestimated. There is a good chapter on wood preservatives and their uses. The types of preservatives now available and the methods of treatment are discussed in sufficient detail for the purposes of the average small owner as well as for the larger building operators.

To complete the picture the author discusses the protection of timber used on the farm and in the garden, decay and insect attacks in ships, boats, and marine works, vehicles, and aircraft, etc. Naturally, these items are not discussed in great detail, but the reader is reminded of the importance of the entire subject by their inclusion. The book is well illustrated and the subject matter is well arranged. The nontechnical language does not detract from its value as a reference, although the reviewer himself would have preferred a more technical presentation of some of the problems. While much of the subject matter applies directly to British conditions the general tenor of the presentation is such that the principles Dr. Findlay stresses will apply equally well elsewhere. More attention might have been paid to the tremendous amount of work on decay and insect organisms affecting forest products which has been done in the United States in recent years.

H. J. MACALONEY.

Publications of Interest

A *Handbook for Lumber Offices*, prepared by the West Coast Lumberman's Association is written for the untrained employee of the Lumber industry who is strange to the trade. It contains such chapters as "How Lumber is Distributed," "Lumber Grading," "How to Figure and Invoice Lumber," "Glossary of Terms," "Commonly Used Lumber Abbreviations." An unusual feature is the inclusion of each word of the glossary in shorthand form. The 32-page handbook is priced at $1.00 per copy to lumber offices by the West Coast Lumberman's Association, 1410 S.W. Morrison St., Portland 5, Ore.

* * *

Our Water Resources, an 18-page pamphlet of the national Chamber of Commerce, presents an outline of a plan developed by the chamber for the utilization of the nation's water resources. Copies may be secured from the Natural Resources Department, Chamber of Commerce of the United States, Washington 6, D. C.

* * *

A Forest Policy for New Hampshire, prepared by the Governor's Forest Policy Committee, outlines the forest situation in that state and makes recommendations for a program of cooperative public and private action aimed at guiding and assisting forest owners and industry in making a transition to producing and using continuous forest crops. A 60-man citizens committee prepared the report under the chairmanship of Clarence S. Herr and at the request of Governor Sherman Adams. Persons desiring copies of the report should write the Governor's Forest Policy Committee, 7 South State Street, Concord, N. H.

* * *

The first publication of the Lower Michigan Chapter of the S.A.F. is available for distribution. The Forest Practices Committee of this chapter has completed the *Recommended Forest Practices for the Principal Types of Lower Michigan*. The purpose of this 27-page mimeographed report, which is the culmination of about three years' work by chapter foresters, is to develop recommended cutting practices which will keep forest stands of lower Michigan reasonably productive. Recommended practices are given for the following types: mixed hardwoods, oak, lowland hardwoods, northern hardwoods, aspen, jack pine, red pine, white pine, and swamp conifers. For each type the following are given: description, products produced, major problems, recommended management practices.

Copies of this report are available to non-chapter members from L. W. Gysel, Division of Conservation, Michigan State College, East Lansing, for $.50 per copy to cover the cost of materials and postage.

* * *

Yale Conservation Studies, published by the Yale Conservation Club, is a 100-page, paper-bound book of articles and essays. The theme of the book is based upon the concept of the necessity of integrating all fields of natural resource study and, further, relating such study "to people, their numbers, customs, and population trends." Copies may be obtained from the Yale Conservation Program, 77 Prospect Street, New Haven, Conn., for $1.00 per copy.

Current Literature

Compiled by MARTHA MEELIG, *Librarian, The New York State College of Forestry*

Range Management Section Compiled by FRANCES FLICK, *Library, U. S. Department of Agriculture*

General

Canada's Forests 1946-1950; Report to Sixth British Commonwealth Forestry Commission . . . 1952. 49 pp. Forestry Branch, Dept. of Resources and Development, Ottawa. 1952.

The Story of Arbor Day. By A. N. Lentz. 4 pp. Illus. Ext. Serv. College of Agric. Rutgers Univ. State Univ. of New Jersey, New Brunswick. 1953. Leaflet No. 102.

Profits from Lumber Promotion and Wood Research. By Ralph Macartney. An address before . . . Western Pine Association. . . 12 pp. Illus. National Lumber Manufacturers Association, Washington, D. C. 1953.

Trees and Trails. By Clarence Hylander. 237 pp. Illus. Macmillan Co., New York 11. 1953. $3.00. (Ages 12-16).

The Trees of Long Island. By G. H. Peters. 64 pp. Illus. Long Island Horticultural Society, Farmingdale, L. I. 1952. $1.00.

Forest Economics

Pine Resources and Markets in the Missouri Ozarks. By K. L. Quigley. 20 pp. Illus. Missouri State Div. of Resources and Devel., Jefferson City. 1952. Free.

Research in the Economics of Forestry. By W. A. Duerr and H. J. Vaux, Editors. 475 pp. Charles Lathrop Pack Forestry Foundation, Washington, D. C. 1953. About $5.00.

Forest Influences

Interception of Rainfall in a Young Loblolly Pine Plantation. By M. D. Hoover. 13 pp. Illus. Southeastern Forest Expt. Sta., Asheville, N. C. 1953. Station Paper No. 21.

Forest Management

Continuous Forest Inventory With IBM Mark Sensing. 8 pp. Illus. International Business Machines Corp., New York 22.

Forest Resources

L'Exploitation Forestiere au Congo Belge. By L. E. Eeckhout. 154 pp. Illus. Ministere des Colonies et du Gouvernement General du Congo Belge, Bruxelles. 1953.

Land Use

Land-Use Ordinances of Soil Conservation Districts in Colorado. By S. W. Voelker. 55 pp. Colorado Agric. & Mech. College, Fort Collins. 1952. Tech. Bul. No. 45, Great Plains Council Publ. No. 5.

Logging and Milling

More Wood per Tree by Careful Felling and Bucking. By George Stenzel. 15 pp. Illus. Washington (State) Inst. of Forest Products, Dept. of Conserv. and Devel., Seattle 5. 1953. Bul. No. 14.

The Use of Large Diameter Wheels and Tyres on Forest Extraction Vehicles. By R. G. Shaw. 7 pp. Illus. Great Britain. Forestry Commission, London. 1953. Forest Record No. 18. 9d.

Pathology

Improvements in the Control of Ribes by Chemical and Mechanical Methods. By H. R. Offord and others. 72 pp. Illus. U. S. Dept. of Agric., Washington 25, D. C. 1952. Cir. No. 906. 35 cents (Govt. Print. Off.)

Oak Wilt in North Carolina. By J. H. Jensen and J. E. Ford. Illus. Agric. Ext. Serv., North Carolina State College, Raleigh. 1953. Ext. Folder No. 98.

Range Management

Grasses and Fodder Resources of the British Tropics. By M. S. Motta. Empire Jour. of Experimental Agriculture. Oxford Univ. Press, London. Vol. 20, pp. 283-292. October 1952.

Grasslands and Grasses of Puerto Rico. By O. Garcia-Molinari. 167 pp. Illus. Puerto Rico Agric. Expt. Sta., Rio Piedras. Bul. No. 102. August 1952.

International Grassland Congress 6, 1952. Documents, papers, abstracts. State College, Pa., 1952.

Pâturages Tropicaux. By B. H. Duclos. 88 pp. Illus. Maison Rustique, Paris. 1952. Free.

Range and Livestock Management in the Shortgrass Prairie Region of Southern Alberta and Saskatchewan. By S. Smoliak and H. F. Peters. 11 pp. Illus. Canada Dept. of Agric., Ottawa. Pub. No. 876. November 1952.

Yields and Botanical Composition of Four Grass-Legume Mixtures Under Differential Cutting. By R. E. Wagner. 53 pp. Illus. Supt. of Docs., U. S. Govt. Print. Off., Washington 25, D. C. U. S. Dept. of Agric. Tech. Bul. No. 1063. October 1952. 20 cents.

Recreation

Woodsmoke. By Ellsworth Jaeger. 228 pp. Illus. Macmillan Co., New York. 1953. $2.95.

Silviculture

The Effects of Partial Soil Sterilization with Formalin on the Raising of Sitka Spruce and Other Conifer Seedlings. By M. V. Edwards. 21 pp. Illus. Great Britain Forestry Commission, London. 1952. Forest Record No. 16. 1s. 6d.

Potash Deficiency of Reforested Pine and Spruce Stands in Northern New York. By S. O. Heiberg and D. P. White. 12 pp. American Potash Inst., Inc., Washington 6, D. C. 1952. Reprinted from *Better Crops With Plant Food.*

Progress Report on the Cochran Airplane Seeding Experiment. By J. B. Woods and D. N. Bever. 10 pp. Illus. Oregon State Board of Forestry, Salem. 1952. Research Note No. 10. Mimeog.

The Relationship of Stocking Percent to Number of Trees Per Acre on Artificially Seeded Areas. By D. N. Bever. 9 pp. Oregon State Board of Forestry, Salem. 1952. Research Note No. 9. Mimeog.

Skogsodlingsarbete på Ackord . . . Piece-Work in Reforestation; An Experiment to Solve the Reforestation Problem of a Big Timber Company in Northern Sweden. Text in Swedish with English sumary. By Ulf Helmers and Ivar Byrnäs. 44 pp. Illus. För. Skogsarbetens och Kungl. Domänstyrelsens Arbetsstudieavdelning, Stockholm. 1952. Meddelande N:r 43.

A Summary of Notes from Ten Experimental Direct Seeding Plots Established in the Cochran Area from 1944 to 1947. By D. N. Bever. 23 pp. Illus. Oregon State Board of Forestry, Salem. 1952. Research Note No. 8. Mimeog.

Trees Against the Wind. 31 pp. Illus. State College of Washington Ext. Serv., Pullman. 1953. Pacific Northwest Co-operative Extension Publication Bul. No. 5.

The Vegetation Zones of the Gold Coast. By C. J. Taylor. 12 pp. Govt. Printing Dept., Accra, Gold Coast. 1952. Forest Dept. Bul. No. 4. 2s 6d.

Wood Preservation

Preservative Treatment of Wood by Pressure Methods. By J. D. MacLean. 160 pp. U. S. Dept. of Agric., Washington 25, D. C. 1952. Agric. Handbook No. 40. 40 cents (Govt. Print. Off.)

Wood Technology and Utilization

Etude Pour l'Obtention de Pâtes à Partir des Bois Feuillus Français; fasc. 1 & 2. By M. Vilars. 113 pp. Illus. Commision d'Etude des Bois Feuillus. 1951, 1952.

Fiber Stresses for Wood Poles. By T. R. C. Wilson and J. T. Drow. 10 pp. U. S. Forest Products Laboratory, Madison, Wis. 1953. D1619.

Pyingado. . . By Eloise Gerry. 4 pp. U. S. Forest Products Laboratory, Madison, Wis. 1952. Information Leaflet, Foreign Woods. Mimeog.

Southern Hardwood Buyers' Guide 1953. 55 pp. Illus. Southern Hardwood Producers, Inc., Memphis 3, Tenn.

Society Affairs

Officers and Members of the Council, 1952-1953

GEORGE L. DRAKE, *President*
Simpson Logging Company
Shelton, Wash.

WILLIAM J. BROWN
Woodlands Department
Kimberly-Clark Corporation
Neenah, Wis.

D. B. DEMERITT
Dead River Company
6 State Street
Bangor, Me.

FRANK H. KAUFERT
School of Forestry
University of Minnesota
St. Paul 1, Minn.

ELWOOD L. DEMMON, *Vice President*
Southeastern Forest Experiment Station, Federal Building
Asheville, N. C.

C. OTTO LINDH
U. S. Forest Service
P. O. Box 1310
Albuquerque, N. M.

GORDON D. MARCKWORTH
College of Forestry
University of Washington
Seattle 5, Wash.

RICHARD E. MCARDLE
Forest Service
U. S. Department of Agriculture
Washington 25, D. C.

HENRY CLEPPER, *Executive Secretary*
Mills Building, 17th Street at Pennsylvania Avenue, N. W.
Washington 6, D. C.

EARL PORTER
Southern Kraft Division
International Paper Company
Mobile 9, Ala.

PERRY A. THOMPSON
12 Elkin Court
San Rafael, Calif.

RUTHFORD H. WESTVELD
Department of Forestry
University of Missouri
Columbia, Mo.

The President's Column

Recently the U. S. Department of Agriculture issued a handbook, *The Small Timber Owner and His Federal Income Tax*,[1] prepared by Ellis T. Williams, Division of Forest Economics, Forest Service. This worthwhile publication has been reviewed and approved by the Bureau of Internal Revenue. The preface to the handbook should be of interest to our members.

"A committee of the Society of American Foresters, appointed in 1949 to study the effect of forest taxation on forest practices, had an important part in the conception and development of this handbook. The members of this committee believe (1) that many, if not most, small forest-land owners pay more in income taxes on timber sold or harvested than the law requires; (2) that overpayment detracts from the economic incentive to practice forestry; and (3) that forest practices on small holdings would be improved if the owners were informed of their actual income-tax obligations and opportunities. Members of the committee were helpful in proposing the preparation of this publication, assisting in its organization, and reviewing the manuscript. The committee is composed of Ralph W. Marquis, chairman, Upper Darby, Pa.; Lloyd P. Blackwell, Ruston, La.; W. D. Hagenstein, Portland, Oreg.; E. G. Wiesehuegel, Norris, Tenn.; and E. T. F. Wohlenberg, Ukiah, Calif."

My reason in calling this particular publication to your attention is not a sales talk, as it needs none, or to give praise to a special committee, which it well deserves, but rather to bring out the service to the cause of better forestry our members are doing through various committees, down to the chapter level. The men on these committees are giving freely of their time and talents, without fanfare or expectation of praise or financial return. Their assignments cover a wide range of activities, from problems of finance and higher education down to bare facts, which by the way (and I speak from local knowledge) got immediate results, as would be expected.

Another project, conceived in the S.A.F. Division of Forest Economics and Policy, has recently resulted in an important book. This is *Research in the Economics of Forestry* published by the Charles Lathrop Pack Forestry Foundation, Washington, D. C. ($6.) Edited by William A. Duerr and Henry J. Vaux, the book runs to 475 pages.

Work on this project was started in 1947 under authorization by the Council and financed by a grant from the Pack Foundation. Although a publication primarily of value to the teacher and research worker, the book is worth the attention of all foresters. For it defines forest economics as a field of organized knowledge, and explores the methods of forest economics as a field of research.

Over the years the Society has sponsored many projects similar to the two mentioned. These projects have stemmed from the work of Sections, Divisions, and special committees.

For example, the Appalachian Section's compilation of the three *Cumulated Indexes* for the JOURNAL has been of great value. Likewise, the New England Section's *Important Tree Pests of the Northeast*, *Forestry Terminology* and *Fifty Years of Forestry in the U.S.A.* are two books that have been useful, not only to the professional forester, but to technicians in other fields as well.

Activities such as these give the profession prestige and standing among other professional groups. It might interest the membership to know that 20 Society committees are working on problems of interest to our profession. In addition there are numerous Section and Division committees working on problems of local or specialized interest.

Sorry we do not have any medals we can hand out for service above the line of duty, but I think I speak for the Society in expressing our appreciation and thanks for the fine work these committees are doing. Often the result of their work is the only way the public is aware of our Society and its objectives.

Geo. L. Drake

[1]Agriculture Handbook No. 52. Superintendent of Documents, Washington, D. C. 20 cents.

S.A.F. Starts Forestry Research Project Under Rockefeller Foundation Grant

Dr. Frank H. Kaufert

William H. Cummings

Under a grant of $30,000 from the Rockefeller Foundation of New York, the Society of American Foresters has begun a study of forestry research in America. Announcement of this project was made in the April JOURNAL (page 300).

The study will be carried on during 1953-1954 under the supervision of a steering committee of five, appointed jointly by the Society and the National Research Council. Members of the committee are:

Chairman, E. L. Demmon, vice president of the Society, and director of the Southeastern Forest Experiment Station, Asheville, N. C.,

Henry Clepper, executive secretary of the Society, Washington, D. C.,

Clarence F. Korstian, dean, School of Forestry, Duke University, Durham, N. C.,

Herbert B. McKean, associate director of research, Timber Engineering Company, Washington, D. C.,

Hardy L. Shirley, dean, College of Forestry, State University of New York, Syracuse, N. Y.

Director Appointed

At a meeting of the committee, held May 1, Frank H. Kaufert, dean of the School of Forestry, University of Minnesota, St. Paul, was named as director of the study. Dr. Kaufert will serve as director on a part-time basis until November 1, when he will give it full-time attention.

Also appointed was William H. Cummings of Norris, Tenn., who was employed by the committee as full-time project forester. Mr. Cummings received bachelor's and master's degrees in forestry at the University of Michigan, and also an M.F. from Harvard. He was formerly on the staff of the Central States Forest Experiment Station, and until last March was a research forester in the Division of Forestry Relations, Tennessee Valley Authority.

Purpose of the Study

The launching of this study was timed to coincide with the 25th anniversary of the McSweeney-McNary Forest Research Act, passed by Congress in 1928. However, the survey will not be confined to federal research activities, but will cover research by the forest products industries, the states, educational institutions, and agricultural experiment stations.

Although the principal emphasis will be on forestry and wood-use research, studies will be made also of research in allied fields, including forest-wildlife management, and forest-range management.

The purpose of the project is threefold: (1) to survey the progress of forestry research during the past twenty-five years; (2) to determine the current scope and extent of research activities by all agencies in all fields; and (3) to forecast probable research needs during the next quarter-century.

The report of the findings of the study will be published by the Society as a book late next year. Meanwhile, the cooperation of all agencies presently engaged in research activities will be sought.

Information about the progress of the survey will be published periodically in the JOURNAL.

Annual Meeting Paper Available in Booklet Form

The paper, "Laminating and Steam-Bending of Treated and Untreated Oak for Ship Timbers," by Herbert B. McKean, R. R. Blumenstein, and W. F. Finnorn which was presented at the joint meeting of the Canadian Institute of Forestry and the Society of American Foresters at Montreal in November, 1952, is available in booklet form from the Timber Engineering Company, 1319 18th St., NW, Washington 6, D. C. This paper was also presented as an article in the December 15, 1952, issue of the *Southern Lumberman*.

Northern California Section Officers to be Installed

George A. Craig of Sacramento has been elected chairman of the Northern California Section, S.A.F., for the year beginning June, 1953.

Other new officers are John Callaghan, vice chairman, and Kenneth Bradshaw, secretary-treasurer.

All new officers are scheduled for installation at the spring field meeting of the section June 5 and 6.

Craig is associate editor of *The Timberman* and is well known throughout the Section for his participation in Section affairs as well as past work with the California Division of Forestry and the Western Pine Association.

John Callaghan has been with the state organization for 15 years and is deputy state forester of the North Sierra District with headquarters at Redding.

Ken Bradshaw is project leader for vegetation-soil mapping work of the experiment station at Berkeley, where he has worked since 1946 in the Division of Forest Economics.

All three new officers are alumni of the University of California, School of Forestry.

Winter Meeting New England Section

The winter meeting of the New England Section, S. A. F., was held at the Somerset Hotel in Boston, March 12 and 13. Chairman E. L. Giddings presided at the first session, which was devoted to business and the presentation of committee reports.

The afternoon session was under the chairmanship of Ernest M. Gould, Jr.,

Harvard Forest. A paper entitled "Forestry in Transition," was delivered by Charles L. Tebbe, regional forester, U. S. F. S. The remainder of the session was given over to two panel discussions, "Adjustments in the Utilization of Forest Resources," and "Adjustments in Management and Silviculture."

At the annual banquet, Dudley Harmon, retired executive vice-president of the New England Council, spoke on the subject of New England industry. Professor Robert I. Ashman served as toastmaster.

At the morning meeting, March 13, Mr. William A. Duerr acted as chairman for a panel, "Adjustments in Programs and Policies."

Elected as members of the Executive Committee for the period, winter meeting-1953 to winter meeting-1954 were: C. D. Ellis, representing eastern Canada; Norman Gray, Maine; J. Harry Rich, Massachusetts, and Francis Smalley, Vermont.

The meeting was closed by the submission of resolutions by the Resolutions Committee.

New Zealand Forester Desires Correspondence with American

Arthur H. Deane, a cadet (that is, a forester in training) in the New Zealand Forest Service, wishes to correspond with one or more young foresters in America.

Anyone interested should write Mr. Deane direct in care of the N. Z. Forest Service, P. O. Box 942, Auckland, New Zealand. U. S. letter mail postage to New Zealand is five cents; airmail, twenty-five cents.

Submission of Items for Publication in the JOURNAL

The staff of the JOURNAL solicits items for inclusion in both the Society Affairs and Forestry News sections, and is, in fact, very dependent upon them. There are, however, two difficulties which commonly arise that either reduce the value of contributions or make them entirely useless. Both difficulties come from the time element.

In order that the JOURNAL may be in the mails the first week of the month (the present schedule), the last material sent to the printer must leave the editorial office in manuscript form five weeks or more in advance. For instance, in order to meet the schedule for mailing the June issue on June 1, the last of the last-minute copy had to be sent to the printer April 29. Most of the material for the Society Affairs and Forestry News sections had to be sent prior to that date.

Quite often material is contributed which the staff would very much like to use but cannot because it arrived too late. Many times there is no value in using the item in the month later issue. It is therefore discarded and the contributor's time is wasted and the JOURNAL's usefulness reduced.

A somewhat similar difficulty arises when contributors send in items in advance, but not far in advance, of an occurrence. Three rather important items were left out of this issue. One of them was scheduled for the third week in May, two others for the first week in June. The nature of the events, the manner in which the contributions were worded, prevented the writing of news items to appear in the June issue and reporting the events as having happened.

Had they been submitted about two weeks earlier each of them would have appeared in the May issue to report on future events. Had the contributors postponed their submission until immediately after the actual events, the items would have been used as news in the August issue. As it is, the contributors will feel that they have done their part in reporting (which they certainly have in so far as willingness and effort is concerned) and they will be disappointed at not seeing their material in print.

Material which reports coming events should be received by the JOURNAL at least five weeks before the first day of the month of issue, and should even then avoid dates during the first half of that month.

Unless there is special reason to give advance notice of an event, an item about it is usually much more valuable when it reports the actual occurrence, at which time definite and pertinent information about it may be written.

Make Plans Now to Attend Annual S.A.F. Meeting in Colorado Springs, September 14-17

An attendance of 800 members, their ladies, and guests is expected at the fifty-third annual meeting of the Society, to be held in Colorado Springs, Colo., September 14-17.

The following information about the meeting should enable members to make their plans to attend and to request room reservations. Additional information will appear in subsequent issues of the JOURNAL.

Colorado Springs is easily accessible by airlines, railroads, and highways.

The airlines are Braniff, Continental, and Monarch.

The railroads are Chicago, Rock Island and Pacific; Atchison, Topeka and Santa Fe; Denver, Rio Grande & Western; Colorado and Southern (Burlington); and Missouri Pacific.

Three U. S. highways pass through the city—U. S. 85-87, north and south; and U. S. 24, east and west.

Schedule of Events

Those expecting to attend the meeting are urged to arrive in Colorado Springs on Sunday, September 13, or not later than the morning of Monday, September 14. The open meetings start on Monday morning.

As will be seen from the following schedule of events, there will be numerous meetings and sessions arranged so as to provide attractions for a diversity of interests. The July issue of the JOURNAL will contain the complete program of topics and speakers.

Sunday, September 13

S.A.F. Council, morning and afternoon meeting.
JOURNAL OF FORESTRY Editorial Board, evening conference.
Committee on Accrediting, evening conference.

Monday, September 14

Division of Education, morning and afternoon sessions.
Division of Silviculture, morning and afternoon sessions.
Divisions of Private Forestry and Forest Products, joint morning and afternoon sessions.
Division of Public Relations, evening session.
Division of Economics and Policy, evening session.

Tuesday, September 15

General meeting, morning.
Society Affairs session, afternoon.
Chuck Wagon Dinner at the Garden of the Gods, evening.

Wednesday, September 16

Division of Forest Management, morning and afternoon sessions.
Divisions of Watershed Management and Range Management, joint morning and afternoon sessions.

_____, 1953

Hotel Reservations Committee,
Society of American Foresters,
c/o Chamber of Commerce,
Colorado Springs, Colorado.

Please make a reservation for the following room accommodations for arrival on September ____ a.m. p.m. Departure date, September ____.

I understand that accommodations will be provided at the daily rate specified, if available; otherwise the next nearest rate will apply.

____ Single room with bath. Rate $____.

____ Double-bed room with bath. Rate $____.

____ Twin-bed room with bath. Rate $____.

____ Suite (parlor, twin-bed room, and bath). Rate $____.

____ Other (specify accommodations desired).

_____. Rate $____.

First choice hotel _____.

Second choice hotel _____.

Motel or tourist court (specify accommodations desired).

_____. Rate $____.

The above room accommodations are requested for the following persons, in addition to myself. (Print or type names and addresses legibly.)

_____

_____

_____

My name: _____

Street address: _____

City, zone, state: _____

Divisions of Recreation and Wildlife Management, joint morning and afternoon sessions.
Annual Society dinner, evening.

Thursday, September 17

Choice of two all-day field trips.

Ladies' Activities

Ladies are cordially invited. There will be a special reception room available to the ladies throughout the meeting, and an early get-acquainted tea has been planned. In addition several delightful auto trips have been arranged to scenic and historic places of interest in the Pikes Peak region.

Ladies are especially invited to the Chuck Wagon dinner in the Garden of the Gods on September 15 (sports wear *de rigueur*), and to the annual Society dinner on September 16.

Program Committee

The chairman of the committee in charge of the program for the meeting is J. V. K. Wagar, School of Forestry and Range Management, Colorado A & M College, Ft. Collins, Colo.

The other members of the committee are David H. Canfield, T. J. Fillas, W. G. McGinnies, and Harry R. Woodward.

Arrangements Committee

The chairman of the Committee on Arrangements is Raymond E. Phillips, U. S. Forest Service, Colorado Springs, Colo.

Assisting Mr. Phillips and heading up special task committees are the following:

Information and Publicity, J. N. Hessel.
Registration, R. B. McKennan.
Reception and Welcome, David S. Nordwall.
Society Dinner, Henry M. Shank.
Chuck Wagon Dinner, Ralph R. Hill.
Hotel Reservations, Elmer R. Miller.
Exhibits, Clinton H. Wasser.
Projection and Amplifying, David H. Canfield.
Meeting Rooms, Jacob Roeser, Jr.
Field Trips, Everett Lee.
Ladies' Activities, Mrs. R. E. Phillips.

Hotel Reservations

A special Society committee will handle requests for hotel reservations, which will be filled in the order received. This committee cannot be responsible for failure to obtain rooms by those making reservations direct with hotels.

The reservation coupon is for your

convenience in requesting hotel rooms. Please send your request to the committee to avoid delay and confusion. Room assignments will be made promptly, and you will receive a confirmation in two weeks or less. Anyone desiring to make a reservation without tearing a page from the JOURNAL may do so simply by supplying the necessary information in a letter addressed to the committee.

The Antlers Hotel is the headquarters for the meeting. But since the Antlers cannot accommodate everyone, other hotels and motels in the city will cooperate in housing members.

There follows a list of hotels available for this meeting and their daily rates. All except the Broadmoor are within five minutes' walking time of the City Auditorium where most of the sessions will be held. All rates listed are European plan (without meals).

In addition there are numerous good motels and tourist lodges within two to five miles of City Auditorium. Those who will have their own automobile transportation will find these motels quite convenient and somewhat less expensive than the city hotels.

Hotels

All hotels listed are within five minutes' walking time of City Auditorium, except the Broadmoor, which is 4½ miles. Daily room rates with bath (European plan, without meals) are shown.

Antlers Hotel, Cascade and Pikes Peak Avennes, the headquarters hotel for the meeting. Single rooms, $7 to $9. Double and twin-bed rooms, $9 to $11. Suites, $12 to $20.

Alta Vista Hotel, 118 North Cascade Avenue. Single rooms, $4 to $6. Double and twin-bed rooms, $6 to $9.

Broadmoor Hotel (4½ miles to City Auditorium). Single rooms, $10. Double and twin-bed rooms, $15.

Acacia Hotel, 104 East Platte Avenue. Single rooms, $4.50 to $6. Double and twin-bed rooms, $7 to $9.

The Alamo Hotel, 126 South Tejon Street. Single rooms, $4 to $6. Double and twin-bed rooms, $6 to $14.

Joyce Hotel, 10 South Weber Street. Single rooms, $6. Double rooms, $8. Twin-bed rooms, $10 to $12. Double rooms with connecting bath, $5 and $6.

Motels and Tourist Courts

The Hotel Reservations Committee has listed 60 motels and tourist courts in Colorado Springs and Manitou Springs, all within two to five miles of City Auditorium.

Daily rates range from $3.50 to $10 for one or two persons; $5 to $15 for three or four persons; and $8.50 to $20 for four to six persons.

Fourth Call for Council Nominations

All voting members are hereby notified that the regular biennial election will be held December 5, 1953. A president, vice president, and nine other members of the Council will be elected for the two-year term 1954-1955.

The present Council is listed in the box on page 454. Any or all of these incumbents may be renominated, provided they accept the nomination in writing.

President Drake has announced that he will not be a candidate for reelection.

Membership on the Council is restricted by the Constitution to Members (formerly Senior Members) and Fellows. Any Member or Fellow is eligible to hold office who is in good standing and who accepts the nomination in writing and declares his willingness to serve if elected.

Each voter will have an opportunity to ballot on all candidates for office. Council members are elected in accordance with the system of proportional representation. The procedure of proportional representation will be explained in a later issue of the JOURNAL. It is the system by which the Society has been electing Council members for two decades. Candidates for the office of president are voted on separately; the candidate who receives the highest vote is declared elected president, and the candidate who receives the next highest vote is declared elected vice president.

How Nominations Are Made

The Constitution (Article VIII, Section 2) states the conditions under which nominations are made by petition.

1. Each petition shall name but one candidate.
2. All candidates must be eligible to hold elective office.
3. A petition shall bear the signatures of at least ten voting members who at the time of signing the petition are eligible to vote in the coming election. (Eligible voting members are Junior Members, Members, and Fellows in good standing.)
4. A voting member may not sign more than one nominating petition for President or more than one nominating petition for a member of the Council. That is, he may sign two, but no more.
5. Petitions must be in the Society office by October 2, 1953.

The Society has no special form for submitting nominating petitions. They may be written as follows:

We, the undersigned voting members of the Society of American Foresters, hereby nominate John Doe, a Member (or Fellow), for the office of president (or member of the Council) for the two-year term 1954-1955.

All nominating petitions should be sent promptly to the Society office. The executive secretary will gladly provide information about nominating or election procedure.

Nominations Received

On the date this issue went to press the following nominations had been received.

For President: Walter J. Damtoft, Canton, N. C. (Council Member, 1944-1947.)

E. L. Demmon, Asheville, N. C. (Vice president, 1952-1953.)

Gordon D. Marckworth, Seattle, Wash. (Council Member, 1950-1953.)

For the Council: W. C. Hammerle, New Orleans, La.

P. D. Hanson, Missoula, Mont.

D. E. Hess, Gettysburg, Pa.

R. Vance Miles, Jr., Tuscaloosa, Ala.

Galen W. Pike, Duluth, Minn.

Carl A. Rishell, Washington, D. C.

T. D. Stevens, East Lansing, Mich.

J. Herbert Stone, Portland, Ore.

Charles L. Tebbe, Philadelphia, Pa.

R. H. Westveld, Columbia, Mo. (Council Member, 1952-1953.)

Edwin G. Wiesehuegel, Norris, Tenn.

The Nominating Committee will make no nominations of its own unless the voting membership fails to make the required minimum number of nominations by petition. Voting members should accordingly get busy and make their own nominations.

HAROLD B. SHEPARD, *Chairman, Nominating Committee.*

Nominations for Grade of Fellow Now Open

All Members (formerly Senior Members) and Fellows of the Society are hereby advised that nominations for the grade of Fellow are now open. The election of Fellows will be held at the time of the Society's regular biennial election, December 5, 1953.

As defined by the Constitution (Article III, Section 6), "Fellows shall be foresters of outstanding achievement as leaders in responsible directive or distinctive individual work of a fruitful character. They shall be elected from the Members and shall be engaged in forestry work at the time of their election."

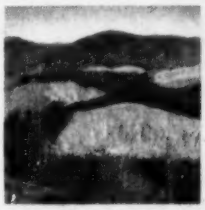
MOTHER AND YOUNG SKUNKS inspect an old logging skidway on a Pacific Northwest tree farm

tree farms grow wood for your grandchildren . . .

Generation after generation, the vast forests of America have supplied wood for an increasing volume and variety of useful products. Private industrial forestry has proven that these forests can be both used and perpetuated . . . to supply wood for you today and your grandchildren in the future. This is being done by managing timber as a crop on privately owned tree farms.

Illustrated above is part of an active tree farm. Years ago, when the trestle was new, nearby mature trees were harvested and hauled to mills by train. New trees grew on the cut-over land . . . springing up from seeds cast by blocks of parent trees left for that purpose. In 60 or 70 years, these trees will be harvested and another new forest will begin to grow.

In the United States, there are now more than 4,000 privately owned tree farms consisting of about 27 million acres of commercial timberlands. All of the forestlands owned by Weyerhaeuser Timber Company are managed as certified tree farms under the direction of skilled industrial foresters. *Write us at Box A, Tacoma, Washington, for your free copy of our interesting and colorful new booklet, Tree Farming in the Pacific Northwest.*



To grow new forests in the fir region, blocks of seed trees are left standing to naturally reforest harvested lands.

Durable and colorful, rayon fabric and cloth are useful products made of wood in the form of viscose cellulose pulp.

Wood is one of the nation's most valuable and versatile raw materials. People and industry use wood every day as lumber, pulp and paper, fibers, chemicals and in many other ways. To supply this market, our company is growing trees and manufacturing a variety of forest products.

Weyerhaeuser Timber Company

National opinion surveys indicate that the public does not know about the progress being made in industrial forestry. Weyerhaeuser Timber Company is telling part of the story in a series of national magazine advertisements such as reproduced above. The Company believes that all who are engaged in industrial forest management should tell the facts about tree farming at every opportunity.

WORKING IN THE PACIFIC NORTHWEST TO CREATE A PERMANENT FOREST INDUSTRY

DON'T BREAK YOUR NECK! PREVENT ACCIDENTS!
Prune the TALLEST tree while standing SAFELY on the ground.
CUT LABOR COSTS 1/3 to 50%
DOUBLE PRODUCTION! With the New, Amazing, LIGHTWEIGHT ALUMINUM Comb. Sawing, Pruning, Trimming, Fruit Picking, Shaking Poles.

Combine Sections of Poles to make Poles up to 80 ft. tall. Weighs 1 lb. per 5 ft. 70c per ft. Attachments extra.
HOW TO PRUNE FRUIT & SHADE TREES
No breakage. No Splinters. Lasts Forever. SEND FOR FREE CATALOG & FREE BOOKLET
J. B. Beaird Co. Inc.
300-S. Los Angeles St.
Los Angeles 13, Calif. - MA. 6-9397

A Zoologist Writes: "Every imaginable remedy tried for protection against ticks and chiggers; only Ticks-Off" passed the acid test."
STOP INSECT BITES!
PREVENT DISEASE & INFECTION!
TICKS-OFF

More Than A Repellent
SAFE! FAST! Keeps away Chiggers, Ticks, Mosquitoes, Flies. A few second spray protects you all day! Ask your dealer.
5 Oz. & 12 Oz. Bombs
WHITMIRE'S, ST. LOUIS 10, MO.

BRANDING HAMMERS
For branding logs, poles, ties, and pulpwood. Trade-mark your products.
A. R. SMITH
Marking Devices
10003 S. E. ECKLER AVENUE
PORTLAND, OREGON

GROW TREES
FOR XMAS TREES AND FORESTRY
Fir, Pine and Spruce in Variety
Seedlings and Transplants
Write for Price List
Suncrest Evergreen Nurseries
P. O. Box. 643, Johnstown, Pa.

Nominations by Petition

The procedure for placing Members in nomination for the grade of Fellow is by petition. The Society has no printed form for this purpose; the petition may be typewritten thus:

We, the undersigned Members and Fellows of the Society of American Foresters, hereby nominate ——— for election to the grade of Fellow in 1953.

Remember these simple rules:

1. A petition may not name more than one candidate.

2. It must be signed by 25 Members or Fellows in good standing.

3. It should be accompanied by a factual, not eulogistic, biographical sketch of at least 200 words giving an account of the nominee's professional career and accomplishments.

4. It must be received in the executive office of the Society in Washington, D. C., not later than October 2, 1953.

The executive employees of the Society cannot be responsible for obtaining signatures on partially completed petitions or on petitions incomplete by reason of unacceptable signatures (that is, signatures of other than Members and Fellows in good standing).

Nominations Received

On the date of going to press, the following Members had been nominated for the grade of Fellow:

For Fellow: H. O. Cook, Mass.
Charles S. R. Cowan, Wash.
George L. Drake, Wash.
Paul M. Dunn, Chile
R. E. McArdle, D. C.
R. R. Reynolds, Ark.
T. Schantz-Hansen, Minn.

Election Procedure

Fellows are not elected by the membership at large, but by a board of electors which consists of all present Fellows and the present Council. (A Council member who is also a Fellow has but one vote.)

To win election a candidate must receive an affirmative vote of not less than one-half the total votes cast.

Significance of the Grade

The highest membership distinction that can be conferred by the Society, this grade is awarded in recognition of outstanding achievement. Fellows do not pay increased dues; their dues are the same as those of Members.

Since the Society was founded in 1900, there have been 91 Fellows elected. At the present time the number of living Fellows is 62.

Since the last election in December 1951, two Fellows have died: J. W. Girard and Ellwood Wilson.

List of Fellows

The current roster of Fellows follows. The state in which each Fellow is domiciled and the year of his election are shown after his name.

Allen, Shirley W., Michigan, 1948.

Baker, Fred S., California, 1949.
Besley, Fred W., Maryland, 1940.
Brundage, F. H., Oregon, 1949.
Butler, Ovid, Maryland, 1940.

Carter, E., District of Columbia, 1942.
Chapman, H. H., Connecticut, 1922.
Clapp, Earl H., Maryland, 1930.
Clepper, Henry, Virginia, 1949.
Coffman, John D., California, 1946.
Curran, Hugh, Venezuela, 1951.

Damtoft, W. J., North Carolina, 1951.
Dana, S. T., Michigan, 1935.
Demmon, E. L., North Carolina, 1951.

Eldredge, I. F., Louisiana, 1942.
Evans, C. F., Georgia, 1949.

Ferguson, J. A., Pennsylvania, 1949.
Fischer, A. F., California, 1940.
Fritz, Emanuel, California, 1951.
Frothingham, E. H., California, 1942.

Gill, Tom, District of Columbia, 1948.
Granger, C. M., Maryland, 1946.
Greeley, W. B., Washington, 1918.
Guise, Cedric H., New York, 1951.
Guthrie, John D., Virginia, 1940.

Hall, W. L., Arkansas, 1940.
Hartley, Carl P., Maryland, 1949.
Hawes, A. F., Connecticut, 1939.
Hawley, R. C., Connecticut, 1942.
Heintzleman, B. F., Alaska, 1951.
Holmes, J. S., North Carolina, 1939.
Hosmer, Ralph S., New York, 1932.
Hunt, George M., Wisconsin, 1951.

Illick, J. S., New York, 1946.

Jeffers, D. S., Idaro, 1949.

Kelley, E. W., Montana, 1949.
Kellogg, R. S., Florida, 1949.
Kinney, J. P., District of Columbia, 1942.
Koch, Elers, Montana, 1940.
Korstian, C. F., North Carolina, 1942.
Krueger, Myron, California, 1951.

Lowdermilk, W. C., California, 1948.

MacDonald, G. B., Iowa, 1944.
Marsh, R. E., District of Columbia, 1948.
Martin, Clyde, Washington, 1948.
Mason, D. T., Oregon, 1948.
Morrell, F. W., Virginia, 1951.
Mulford, Walter, California, 1939.
Munger, T. T., Oregon, 1946.
Munns, E. N., California, 1949.
Preston, John F., Maryland, 1948.
Price, Jay F., Wisconsin, 1951.
Schmitz, Henry, Washington, 1940.
Shirley, H. L., New York, 1951.
Show, S. B., California, 1948.
Siecke, E. O., Texas, 1946.
Sparhawk, W. N., New Hampshire, 1946.
Watts, Lyle F., Oregon, 1946.
Winslow, C. P., District of Columbia, 1942.
Wirt, G. H., Pennsylvania, 1948.
Ziegler, E. A., Pennsylvania, 1949.
Zon, Raphael, Minnesota, 1918.

Dues Deadline, June 30

Members whose dues are not paid by June 30 will be in bad standing. They will be ineligible to vote in the coming election, to receive Society publications, or be a candidate for office until their dues are paid.

When good reasons are advanced, the Council may, upon request, extend the period during which current dues may be paid.

Coming Events

C.I.F. Annual Meeting

The Canadian Institute of Forestry will hold its annual meeting, with the theme of "The Forest Situation in Canada," October 19-21, in Winnipeg, Manitoba.

S.A.F. Annual Meeting

The Society of American Foresters will hold its annual meeting, with the theme of "Nature on Edge", September 14, 15, and 16, in Colorado Springs.

American Forest Congress

The American Forest Congress of the American Forestry Association will meet in Washington, D. C., October 29, 30 and 31.

Forest Products Research Society

The seventh annual meeting of the Forest Products Research Society will be held June 15, 16, and 17 in Memphis, Tenn., it has been announced by Kenneth G. Chesley, F.P.R.S. president and director of research at Crossett Lumber Company, Crossett, Ark.

Announcement of Applicants

Applicants for admission, advancement, or reinstatement whose membership applications were received in the Society office during the month of April are listed below.

Action regarding the eligibility of these applicants will be taken by the Council as of July 1, 1953. Any communications from voting members relating to the membership eligibility of any of these applicants should be received in the Society office prior to that date.

Allegheny Section

Student Grade

PENNSYLVANIA STATE COLLEGE

Phillips, R. L.
Slusser, N. F.
Sopper, W. E.
Woodrow, R. E.

WEST VIRGINIA UNIVERSITY

Cromer, G. A.
Goughnour, C. A.
Johnson, R. E.
Johnson, R. J.
McCutcheon, H. D.
Toney, F. M.
Vinoski, E. B.

Add SIX "HANDS" TO YOUR CREW!

WITH A Wilton PATS. PEND. MOTOR-DRIVEN BRUSH SAW

—and save $50 a day!

One man with a Wilton Brush Saw clears more brush than six men with axes and brush-hooks! He'll cut tangled briers, brambles, vines, underbrush, saplings, second growth *horizontally at ground level* — safely, quickly, cleanly. Wilton Brush Saw's light weight, perfect balance, high power and easy mobility are the perfect combination for clean cutting with a minimum of labor and time.

The Wilton Brush Saw is *safe* to use — easy to guide and control, and fool-proof because of simplicity of design with a minimum of moving parts and light weight.

Rugged motor and husky V-belt drive Wilton's non-clogging 8" or 10" saw blade at 3500-4000 r.p.m. at maximum power. No gears to strip — nothing to oil — and built so operator uses both hands to guide its razor-sharp, high-speed blade through all growth up to 4" in diameter. The Wilton Brush saw cuts down worker fatigue, too — speeds tough clearing jobs, and pays for itself in a month or less. Economical to use, and sensibly priced to fit forestry budgets.

FOB, Milford, N. H. $295.00

SPECIFICATIONS

Automatic recoil starter
Blade set at 10° for cutting
Simple centrifugal clutch
1.2 h.p. engine, 3500-4000 r.p.m.
Push-button stop control
Weight, under 30 pounds.
Shoulder strap distributes weight.
4" tubular aluminum shaft with 1/8" thick wall.
Entire saw fits in car trunk.
Bearings sealed in oil
Aluminum shield against thigh for perfect balance, easier guiding.

MANUFACTURED BY Williams & Hussey MACHINE CORP.
23 CLINTON STREET • MILFORD, N. H.

Junior Grade

Bevard, G. N., Shannon Rd., Vernona, Pa.; Pa. State, B.S.F., 1952.
David, R. R., 1206 Washington St., Hoboken, N. J.; Univ. of Mo., B.S.F., 1953. (Student, 1951).
Hudson, W. M., 123 Alexander Ave., Greensburg, Pa.; Pa. State, B.S.F., 1952.

Member Grade

Cranmer, C. B., Forester, N. J. Dept. Cons. and Dev., Trenton, N. J.; Pa. State, B.S.F., 1930. Reinstatement.

Appalachian Section

Student Grade

DUKE UNIVERSITY

Crockett, J. M.

Junior Grade

Bland, W. A., Nursery Supt., Holmes State Forest Nursery, Penrose, N. C.; N. C. State, B.S.F., 1942.
Zahner, R., Grad. Student, Duke Univ., Durham, N. C.; Duke, B.S., (Botany), 1950; M.F., 1951.

Affiliate Grade

Charbonneau, D., Forester, Canal Wood Corp., Conway, S. C.; Colo. A & M., B.S., (Game Mgmt.), 1948.

Central Rocky Mountain Section

Student Grade

COLORADO A & M COLLEGE

Allison, C. T. Evenden, G. W.

Member Grade

Hervey, D. F., Assoc. Prof., Range Mgmt., Colo. A & M., Ft. Collins, Colo.; Colo. A & M., B.S.F., 1939; Univ. of Calif., M.S.F., 1948. (Junior, 1946).
Schultz, E. W., Asst. Forest Supv., San Isabel Natl. Forest, Pueblo, Colo.; Oregon State, B.S.F., 1941. Reinstatement.

Central States Section

Student Grade

MICHIGAN STATE COLLEGE

Johnson, J. A.

UNIVERSITY OF MICHIGAN

Libby, W. J.

Junior Grade

Forst, P. P., 2016 S. 11th Ave., Maywood, Ill.; Purdue Univ., B.S.F., 1953. (Student, 1951).
Wommack, D. E., 115 Connolly St., W. Lafayette, Ind.; Purdue Univ., B.S.F., 1953. (Student, 1951).

Member Grade

Gabriel, S. J., Asst. Chief Forester, Forest Preserve Dist., River Forest, Ill.; Mich. State, B.S.F., 1942. (Junior, 1947).

Affiliate Grade

Ackermann, K. E., Asst. Mgr., Pinckney Recreation Area, Pinckney, Mich.; Mich. College Mining and Tech., B.S., (Forestry), 1951.
Aho, C. P., Engr., Public Service Co. of Northern Ill., Glencoe, Ill.; Mich. College Mining and Tech., B.S., (Forestry), 1949.
Cross, R. L., 449 Meadow Lane, Libertyville, Ill.; Mich. College Mining and Tech., B.S., (Forestry), 1952.
Eckel, E. J., Asst. Dist. Forester, Forestry Div., Dept. of Cons., Gaylord, Mich.; Mich. College Mining and Tech., B.S., (Forestry), 1949.

Columbia River Section

Student Grade

OREGON STATE COLLEGE

Madden, B. E. Paine, D. P.
Metcalf, R. G.

Junior Grade

Lafer, R. J., Forester, U.S.F.S., Mt. Hood Natl. Forest, Estacada, Oreg.; Mich. State, B.S.F., 1951.
O'Connor, J. J., Dist. Asst., U.S.F.S., Ashland, Oreg.; Oregon State, B.S.F., 1952.
Robinson, D. L., Forester, U.S.F.S., Tiller, Oreg.; Mont. State, B.S.F., 1952.
Sabol, E. M., Forester, U.S.F.S., Bend, Oreg.; Mich. State, B.S.F., 1950.

Member Grade

Sommer, H. G., Branch Forester, Weyerhaeuser Tbr. Co., North Bend, Oreg.; Oregon State, B.S.F., 1949; Yale, M.F., 1952. (Junior, 1949).
Stein, W. I., Forester, Siskiyou Cascade Research Center, Roseburg, Oreg.; Oregon State, B.S.F., 1948; Yale, M.F., 1952. (Junior, 1949).
Wheeler, W. P., Asst. Prof., Oregon State Corvallis, Oreg.; Univ. of Minn., B.S.F., 1948; M.F., 1949. (Junior, 1950).
Winn, M. H., Asst. Dist. Forester, Bur. of Land Mgmt., Roseburg, Oreg.; Oregon State, B.S.F., 1940. (Junior, 1950).
Wood, K. B., Pres., K. B. Wood and Associates, Inc., Portland, Oreg.; Univ. of Mich., B.S.F., 1934; M.F., 1936. Reinstatement.

Affiliate Grade

Bailey, D. R., Head Chainman, Weyerhaeuser Tbr. Co., North Bend, Oreg.; Univ. of B.C., B.S., (Forestry), 1950.
Bjornsen, R. L., Dist. Asst., U.S.F.S., Lakeview, Oreg.; Utah State, B.S., (Mgr. Mgmt.) 1950.
Coleman, R. E., Tbr. Cruiser, Brown and Brown, Portland, Oreg.
Hildenbrand, H. A., Forester, Assoc. Plywood Mills, Inc., Eugene, Oreg.

Associate Grade

Tarrant, R. F., Soil Scientist, Pacific N.W. Forest and Range Exp. Sta., Portland, Oreg.; Oregon State, B.S., (Soils), 1941.

Gulf States Section

Junior Grade

Duke, A. G., Tbr. Marking Foreman, Masonite Corp., Laurel, Miss.; A.P.I., B.S.F., 1949.
Lee, R. E., Ento., U.S.D.A., Liberty, Texas; Duke, BS., (Forestry), 1950; M.S.F., 1951.

PLANTING TIME IS HERE....

And for spot planting in open stands and for landowners who have only a few acres to put into tree production, nothing is better than the

COUNCIL OST PLANTING BAR

For transplanting pine seedlings, as well as bulbs and small plants, we recommend the

COUNCIL TRANSPLANTER

Fire Swatters Fire Rakes
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THE COUNCIL TOOL COMPANY, INC.
Fine Edge Tools Since 1886
WANANISH, NORTH CAROLINA

FORESTER
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Approved for use by U. S. Forest Service

Proved superior in over 6 years of field service

No Flash-back
No fuel slopping
No air pump
No pressure build-up
No explosive vapors
No pre-heating
Instant operation

SAFE • EFFICIENT
RELIABLE • ECONOMICAL

Burns Diesel Fuel or Stove Oil
1¼ Gallon Capacity
Weight loaded 16 pounds

U. S. Patent No. 2578878

Write for descriptive folder and price list.

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69 Main St., SAN FRANCISCO, California

McMillan, E. P., Dist. Forester, Miss. Forestry Comm., Rolling Fork, Miss.; N. C. State, B.S.F., 1950.

Member Grade

Fender, D. E., Forest Engr., Int. Paper Co., Nacogdoches, Texas; Univ. of Ga., B.S.F., 1942. Reinstatement.

McMahon, J. T., Forester, W. B. Cariker Lbr. Co., Kountze, Texas; La. State Univ., B.S.F., 1948. (Junior, 1948).

Molloy, L. H., Forester, Crosby Lbr. and Mfg. Co., Crosby, Miss.; La. State Univ., B.S.F., 1939. (Junior, 1947).

Affiliate Grade

Clark, B. M., Consulting Forester, Keith Cranston Assoc., Leland, Miss.; L.P.I., B.S., (Forestry), 1950.

Maxwell, R. D., Field Asst., Int. Paper Co., Jena, La.; L.P.I., B.S., (Forestry), 1950.

Richardson, R. E., Asst. Forester, Industrial Lbr. Co., Elizabeth, La.; L.P.I., B.S., (Forestry), 1952.

Skillern, L., Dist. Forester, S. W. Settlement and Dev. Corp., Silsbee, Texas.

Zontek, F., Forester, Chicago Mill and Lbr. Co., Tallulah, La.; L.P.I., B.S., (Forestry), 1952.

Inland Empire Section

Junior Grade

Dion, C. R., Industrial Engr., Columbia Elec. and Mfg. Co., Spokane, Wash.; Univ. of Minn., B.S.F., 1938. Reinstatement.

Member Grade

Foiles, M. W., Forester, N.R.M. Forest and Range Expt. Sta., Spokane, Wash.; Colo. A & M., B.S.F., 1947. (Junior, 1948).

Helmers, A. E., Forester, Forest Exp. Sta., Priest River, Idaho; Univ. of Idaho, B.S. (Botany), 1942; M.S., (Plant Ecology), 1942. (Junior, 1946).

Watt, R. F., Forester, N.R.M. Forest and Range Expt. Sta., Spokane, Wash.; State Univ. of N. Y., B.S.F., 1943; Yale, M.F., 1947. (Junior, 1947).

Associate Grade

Rumely, J. H., Research Asst., Wash. State College, Pullman, Wash.; Oberlin College, A.B., (Botany), 1948; Wash. State College, Ph.D., (Plant Ecology), 1953.

Intermountain Section

Junior Grade

Worf, W. A., Asst. Dist. Rgr., U.S.F.S., Heber, Utah; Mont. State, B.S.F., 1950.

Member Grade

Guernsey, R., State Forester, State of Idaho, Boise, Idaho; Univ. of Idaho, B.S.F., 1947. Junior, 1948).

Mathews, J. T., Asst. Chief, Div. of Operations, U.S.F.S., Ogden, Utah; Mont. State, B.S.F., 1930. Reinstatement.

Kentucky-Tennessee Section

Affiliate Grade

Berckman, H. W., Asst. Director, Ky. Div. of Forestry, Frankfort, Ky.; Cumberland College, B.S., 1916. Reinstatement.

New England Section

Junior Grade

Dodge, A. G., Jr., Instructor, Dept. of Forestry, Univ. of Mass., Amherst, Mass.; Univ. of Mass., B.S.F., 1953. (Student, 1952).

Paine, L. A., Forest Path., Canadian Dept. of Agric., Div. of Forest Path., Quebec, Canada; Univ. of Idaho, B.S.F., 1942; M.S.F., 1946; Swiss Federal Institute of Tech., Ph.D., 1951. Reinstatement.

Affiliate Grade

Davis, S. B., Forester, Andorra Forest, Stoddard, N. H.; Univ. of N. H., B.S., (Forestry), 1951.

New York Section

Student Grade

STATE UNIVERSITY OF NEW YORK

Elisar, R.

Affiliate Grade

Gates, G. D., Forester, St. Regis Paper Co., Deferiet, N. Y.; State Univ. of N. Y., B.S., (Utilization), 1947.

Willard, N. B., Highland Ave., St. James, L. I., N. Y.; Univ. of the South, B.S., (Forestry), 1951.

Northern California Section

Student Grade

UNIVERSITY OF CALIFORNIA

Emrie, W. J. Pease, W. E.

Junior Grade

Crouch, C. H., Dist. Rgr., U.S.F.S., Dunsmuir, Calif.; Mont. State, B.S.F., 1942.

Heinan, J. C., Dist. Rgr., U.S.F.S., Trinity Center, Calif.; Univ. of Mich., B.S.F., 1941.

Leisz, D. R., Forester, U.S.F.S., Mt. Shasta, Calif.; Univ. of Calif., B.S.F., 1950.

Roberts, H. A., Asst. Operation Supv., Bur. of Ento., and Plant Quar., Oakland, Calif.; Univ. of Me., B.S.F., 1951. Reinstatement.

Member Grade

Branson, W. P., Sealer, Arcata Plywood Co., Fortuna, Calif.; Oregon State, B.S.F., 1940. (Junior, 41R46R53).

Zinke, P. J., Research Stud., Univ. of Calif., Berkeley, Calif.; Univ. of Calif., B.S.F., 1942; M.S.F., 1952. (Junior, 1947).

Associate Grade

Lowrey, L. W., Member of State Legislature, (Third Dist.), Rancher, Rumsey, Calif.; Univ. of Calif., A.B., (Geology), 1926.

Northern Rocky Mountain Section

Junior Grade

Eslyn, W. E., Grad. Stud., Mont. State, Missoula, Mont.; Mont. State, B.S.F., 1950.

Schmautz, J. E., Range Cons., U.S.F.S., Missoula, Mont.; Mont. State, B.S.F., 1947; M.S.F., 1948. Reinstatement.

Member Grade

Boe, K. N., Forester, N.R.M. Forest and Range Expt. Sta., Missoula, Mont.; Mont. State, B.S.F., 1946; M.S.F., 1948. (Junior, 1946).

Ozark Section

Affiliate Grade

Wood, J. R., Forester, Ozark-Badger Lbr. Co., Wilmar, Ark.; Ark. A & M., B.S., (Forestry), 1952.

Puget Sound Section

Junior Grade

Barendregt, P. A., 2808 W. 94th, Seattle, Wash.; Univ. of Wash., B.S.F., 1953. (Student, 1952).

Brown, M. M., 4616 21st N.E., Seattle, Wash.; Univ. of Wash., B.S.F., 1953. (Student, 1953).

Dillard, A. H., 17737 12th N.E., Seattle, Wash.; Univ. of Wash., B.S.F., 1953. (Student, 1953).

Flemer, T. A., 4205 15th Ave. N.E., Seattle, Wash.; Univ. of Wash., B.S.F., 1953. (Student, 1952).

Foldi, F. S., Jr., Forester, Crown Zellerbach Corp., Port Angeles, Wash.; Univ. of Mich., B.S.F., 1948.

Hanson, R. M., 4315 Union Bay Place, Seattle, Wash.; Univ. of Wash., B.S.F., 1953. (Student, 1953).

Hultgren, J., Soil Cons., U.S.D.A., Renton, Wash.; Univ. of Wash., B.S.F., 1950.

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LaFortune, H. B., Inspt., U.S.F.S., Prineville, Oreg.; Univ. of Minn., B.S.F., 1950.
Maxwell, W. G., 4132 Union Bay Lane, Seattle, Wash.; Univ. of Wash., B.S.F., 1953. (Student, 1952).
McIntosh, G. W., Box 589, Bremerton, Wash.; Univ. of Wash., B.S.F., 1953. (Student, 1952).
McMurphy, D. Q., Vader, Wash.; Univ. of Wash., B.S.F., 1953. (Student, 1953).
Moore, R. N., Chelan Hall, Univ. of Wash., Seattle, Wash.; Univ. of Wash., B.S.F., 1953. (Student, 1952).
Schaefer, D. J., 4205 15th N.E., Seattle, Wash.; Univ. of Wash., B.S.F., 1953. (Student, 1952).
Schlachter, R. W., 3911½ Corliss Ave., Seattle, Wash.; Univ. of Wash., B.S.F., 1953. (Student, 1953).

Member Grade

Dowling, D. H., Resident Forester, Weyerhaeuser Tbr. Co., Snoqualmie Falls, Wash.; Univ. of Wash., B.S.F., 1942. (Junior, 1947).
Pedersen, A. H., 1159 19th Ave., Seattle, Wash.; Univ. of Wash., B.S.F., 1943. (Junior, 1946).

Affiliate Grade

Hakala, J. B., Range Cons., Alaska Native Service, Kotzebue, Alaska; Mich. College Mining and Tech., B.S., (Forestry), 1950; Univ. of Alaska, M.S., 1952.

Southeastern Section

Student Grade

UNIVERSITY OF GEORGIA

Kennedy, U. B.

Junior Grade

Baker, W. L., Lane St., Palatka, Fla.; Univ. of Fla., B.S.F., 1953. (Student, 1952).
Barnett, H. V., Asst. Reservation Forester, Camp Stewart, Ga.; Univ. of Fla., B.S.F., 1949.
Entzminger, P. R., Forester, Container Corp. of America, Fernandina Beach, Fla.; Univ. of Fla., B.S.F., 1948.
Margolis, R., Reservation Forester, Post Engr. Sta., Camp Rucker, Ala.; Duke, B.A., 1929; Yale, M.F., 1931. Reinstatement.
Swanson, J. W., Forester, M. W. Smith Lbr. Co., Jackson, Ala.; A.P.I., B.S.F., 1949.
Williamson, R. L., 1204 N. Osceola Ave., Clearwater, Fla.; Univ. of Mich., B.S.F., 1953. (Student, 1952).

Affiliate Grade

Brown, R. E., Jr., Forester, U.S.F.S., Double Springs, Ala.; Okla. A & M., B.S., (Forestry), 1952.
Logan, A. J., Dist. Rgr., U.S.F.S., Haleyville, Ala.; Hendrix College, B.A., (Chem.), 1933.

Associate Grade

Carver, G. L., Prof., Biology Dept., Mercer Univ., Macon, Ga.; Univ. of Mich., A.B., 1908.

Southwestern Section

Junior Grade

Bernard, N. T., Asst. Rgr., U.S.F.S., Springerville, Ariz.; Colo. A & M., B.S.F., 1950.
Cesar, W. R., Forester, U.S.F.S., Springerville, Ariz.; Iowa State, B.S.F., 1950.
Cook, W. R., Forester, U.S.F.S., Jemez Springs, N. Mex.; Colo. A & M., B.S.F., 1950.

Affiliate Grade

Baldwin, J. J., Forester, U.S.F.S., Fredonia, Ariz.; Colo. A & M., (1 yr.).
Rush, L., Forestry Aide, U.S.F.S., Tres Piedras, New Mexico.

Upper Mississippi Valley Section

Student Grade

IOWA STATE COLLEGE

Christ, D. M. Hanisch, R. L.
Fulton, M. D.

Junior Grade

Cross, D. S., 4948 Lyndale Ave. S., Minneapolis, Minn.; Univ. of Minn., B.S.F., 1953. (Student, 1952).
Dykeman, K. K., 4 Elba Ave., Eveleth, Minn.; Univ. of Minn., B.S.F., 1953, (Student, 1951).
Hamilton, L. R., 707 Univ. Ave., S.E., Minn., Minn.; Univ. of Minn., B.S.F., 1953. (Student, 1952).
Harvey, J. J., 829 Pammel Court, Ames, Iowa; Iowa State, B.S.F., 1953. (Student, 1953).
Hemphill, M. W., 317 South Second St., Ames, Iowa; Iowa State, B.S.F., 1952. (Student, 1952).
Popp, R. D., 914 E. 6th St., Davenport, Iowa; Iowa State, B.S.F., 1953. (Student, 1952).
Radtke, D. L., Univ. of Minn., St. Paul, Minn.; Univ. of Minn., B.S.F., 1953. (Student, 1951).
Rosdahl, D. V., 1925 Sheridan Ave., St. Paul, Minn.; Univ. of Minn., B.S.F., 1953. (Student, 1952).
Venners, H. W., 1791 Malvern St., St. Paul, Minn.; Univ. of Minn., B.S.F., 1953. (Student, 1952).

Washington Section

Junior Grade

Foster, A. L., 3479 S. Utah, Arlington, Va.; Colo. A & M., B.S.F., 1953. (Student, 1951).

Wisconsin-Upper Michigan Section

Junior Grade

LeRoux, J. E., Photo Interpreter, U.S.A.F., Sherry, Wisc.; Iowa State, B.S.F., 1950.
Minore, D., Minong, Wisc.; Univ. of Minn., B.S.F., 1953. (Student, 1951).
Smith, P. C., Forester, Cons. Water Power and Paper Co., Rhinelander, Wisc.; Colo. A & M., B.S.F., 1947; M.F., 1948.

Member Grade

Intermill, W. W., Area Supv., Cons. Water Power and Paper Co., Houghton, Mich.; Iowa State, B.S.F., 1932. (Junior, 1946).

Affiliate Grade

Herron, W. E., Asst. to Woods Supt., N. W. Veneer and Plywood Corp., Newberry, Mich.; Mich. College Mining and Tech., B.S., (Forestry), 1952.
McDonald, R. K., Social Worker, Ontonagon County Bureau of Social Aid, Ontonagon, Mich.; Mich. College Mining and Tech., B.S., (Forestry), 1949.
Seiler, E. G., Dollar Bay, Mich.; Mich. College Mining and Tech., B.S., (Forestry), 1950.
Spoerke, J. R., Asst. Forester, Roddis Lbr. and Veneer Co., Ironwood, Mich.; Mich. College Mining and Tech., B.S., (Forestry), 1952.
Zollner, J. A., Asst. Forester, Roddis Lbr. and Veneer Co., Ironwood, Mich.; Mich. College Mining and Tech., B.S., (Forestry), 1952.

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Forestry News

Conservation Organization Representatives Confer with President Eisenhower

Representatives of 19 national organizations active in natural resource conservation had a 15-minute conference with President Eisenhower at the White House on April 28. Spokesman for the group was Ira N. Gabrielson, president of the Wildlife Management Institute.

Dr. Gabrielson informed the President of the group's interest in maintaining high standards in the appointment of personnel to policy making positions dealing with natural resource management, and in maintaining the merit system in respect to scientific and professional positions under civil service.

The group also advocated the strengthening of sound federal land policies in the public interest, and recommended against granting priorities in public land use for the benefit of special users at the expense of the general public.

Among the representatives at the conference were Hugh H. Bennett of the Soil Conservation Society of America; William Voigt, Jr. of the Izaak Walton League; Fred M. Packard, National Parks Association; Miss Harlean James, American Planning and Civic Association; and C. R. Gutermuth of the Natural Resources Council of America. Henry Clepper represented the Society of American Foresters.

On behalf of the Natural Resources Council of America, the President was presented with a framed copy of the Policy on Natural Resources, adopted in 1951. By action of the Council, the Society of American Foresters has endorsed this policy (JOURNAL OF FORESTRY, May 1952).

New Wildlife Chief Named

John L. Farley, Seattle, Wash., has been appointed director of the U. S. Fish and Wildlife Service of the Department of the Interior to succeed Albert M. Day. Mr. Day joined the service in 1918 and has served as director since 1946. Mr. Farley served as executive director of the California Fish and Game Commission from 1929 to 1934 and at the time of his appointment was a community relations director for Crown Zellerbach Corporation.

New Land Bureau Director Appointed

Edward Woozley of Boise, state land commissioner for Idaho, was appointed director of the Bureau of Land Management, Department of Interior, on April 13. Mr. Woozley will succeed Marion Clawson.

C.I.F. Annual Meeting Scheduled

The Forty-fifth Annual Meeting of the Canadian Institute of Forestry will be held in the Fort Garry Hotel, Winnipeg, Manitoba, October 19-21, 1953.

Theme of the meeting will be "The Forest Situation in Canada." S. W. Schortinghuis, chief project engineer, Department of Mines and Natural Resources, Legislative Building, Manitoba, is chairman of the Annual Meeting Committee.

The program will consist of five panel discussion sessions on the following subjects: Forest Protection, Forest Administration, Forest Management, Forest Economics, and Public Relations and Education.

United States foresters are cordially invited by the C.I.F. to attend.

Explore New Uses for Hickory

Fifty foresters and industrialists met at Clemson, South Carolina, in April to explore new methods for using hickory timber. Hickory, whose name is a common household word denoting toughness and durability, has great potential value, but it has been largely overlooked by southern industry. It is plentiful but little used. The theme of the conference was to promote hickory throughout the East and get it on the market.

In opening the meeting, Chairman Walton R. Smith of the Southeastern Forest Experiment Station said, "Here is a wood which resists shock better than steel, but millions of feet of it stand unused because people don't know how to use it and markets haven't been developed. This unique wood, native only to North America, grows from Wisconsin to Texas and east to the Atlantic."

Thomas E. Mitchell, works manager of the Poinsett Lumber and Manufacturing Company, was co-host at the meeting with the experiment station.

A number of committees were organized to carry on work on the growth and properties of hickory, the manufacturing and seasoning of hickory lumber, the preservative treatment of hickory for more durable use, the development of new and better hickory products to be used in the South's widespread textile industry and the use of hickory fiber in the manufacture of pulp and paper.

As this work goes forward, reports will be issued by the Southeastern Forest Experiment Station, Asheville, N. C.

Central International Forest Insect and Disease Conference Held

On January 6 and 7, forest entomologists and forest pathologists of Minnesota, Michigan, Wisconsin, Ontario, Manitoba, and Saskatchewan met at the University of Minnesota, St. Paul, to participate in a pioneer meeting of the Central International Forest Insect and Disease Conference.

Participating in the initial meeting were representatives of the Division of Forest Insect Investigations, U.S.D.A.; Division of Forest Pathology, U.S.D.A. (New Haven Laboratory); Division of Forest Biology, Department of Agriculture, Ottawa; Departments of Conservation of Michigan, Wisconsin, and Minnesota; Universities of Minnesota, Michigan, Wisconsin, Toronto, and Michigan State College; Offices of State Entomologist of Minnesota and Wisconsin; and Canadian Department of Agriculture, Laboratories of Forest Biology.

It was decided that future meetings should continue to stress informal discussions of common problems and research approaches of the various workers who are trying to cope with them.

Dr. Blair M. McGugan, Division of Forest Biology, Science Service, Canadian Department of Agriculture, Forest Insect Laboratory, Sault Ste. Marie, Ontario, Canada, was chosen chairman of the group for the coming year.

A.F.A.'s Trail Riders Celebrate 20th Anniversary

Trail Riders of the Wilderness, organized and operating under the direction of the American Forestry Association, will celebrate their 20th anniversary this season. The A.F.A. estimates that about 350 riders will take to

the trail this summer on trips through wilderness country in national forests in Montana, Idaho, Utah, Colorado, New Mexico and Washington, and two parties will take to canoes and paddle their way through the Quetico-Superior wilderness of the Superior National Forest in Minnesota. Riders share equally in the cost of the trips, and are able to see true wilderness country under experienced and organized leadership, at costs ranging from $195 to $215. The trips vary from 10 to 13 days in length. The program begins on July 5 and ends September 20.

Spring Forecast Shows Shortage in Western States' 1953 Irrigation Water Supply

Irrigation water prospects for the western states for the 1953 season were reported by the U. S. Department of Agriculture to be much less promising than those at the same period last year.

New Mexico, southern Utah, southern and central Nevada, and parts of Arizona and Colorado are cited in the annual spring forecast by the Soil Conservation Service as facing particularly threatening water shortages. Below-normal snow cover and stream flow, short reservoir storage and dry soils are mentioned frequently in the water outlook.

The report is based on snow surveys made during the winter by the S.C.S. and cooperating federal, state and private agencies, including the Forest Service.

More Damage Foreseen by Forest Insects

Continued serious forest damage by the Douglas-fir beetle, the Engelmann spruce beetle, and the spruce budworm is the 1953 outlook for these three insect pests of western forests, U. S. Department of Agriculture entomologists predict in a recent report on American forest insects.

The spruce budworm, in epidemic numbers in Oregon and Washington forests since 1949, is reported by the entomologists to be on the increase in central Montana. They class it as currently the heaviest insect defoliator of forests in Idaho and Utah, and a serious pest in Arizona, New Mexico, and Maine.

The report states that in 1952 the Douglas-fir beetle population had reached epidemic proportions on more than 4½ million acres of forest land in Washington and Oregon. About one billion board feet of lumber have been destroyed by this beetle in the two states. Large scale salvage of infested timber in 1953 can materially reduce this prospective loss, the entomologists believe. In Montana and Idaho, in the Northern Rocky Mountain area, 1952 surveys in eight National Forests revealed losses by this insect ranging from 0.21 percent (considered normal) to as high as 6 percent of the trees.

A severe Engelmann spruce beetle outbreak in Montana and Northern Idaho developed in 1952, and by the end of their active season the beetles were infesting an estimated 800,000 trees in the two states. Engelmann spruce beetle infestation in Colorado, which, since a serious outbreak in 1939, have destroyed about 4 billion board feet of lumber, have been greatly reduced by a combination of man-employed and natural control measures. Abnormally cold winter temperatures in 1951, followed by effective woodpecker feeding and an insecticidal spray control program, have left only a few areas in this state where this insect could again reach epidemic levels in 1953.

Although cooperative aerial spraying projects have controlled the spruce budworm on nearly 3 million heavily infested acres in Washington and Ore-

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gon during the past four years, 1952 surveys indicate more than 1½ million acres are still infested there. New centers of epidemic infestation have developed in previously unsprayed forests, particularly in the Blue Mountain area of Washington and Oregon.

Spruce budworm infestation in the Northern Rocky Mountains reached 1.9 million acres in 1952; an increase of 735,000 acres over 1951. Damage on 132,000 acres is classed as heavy. Twelve thousand acres in Montana were sprayed in 1952 to prevent serious killing of timber in an epidemic area. Defoliation of small trees, particularly those to be cut for Christmas trees, has been a serious problem. Defoliation by the budworm in the intermountain forest regions of Idaho and Utah was evident on nearly 500,000 acres surveyed by air. Heavy defoliation also has been noted by the entomologists on about 200,000 acres in spruce and fir timber in Arizona and New Mexico.

In northern Maine balsam fir stands, the budworm is defoliating trees on about 416,000 acres. Of this total, 326,000 acres show scattered defoliation and 90,000 acres show continuous defoliation.

1952 Worst Forest Fire Year in N.E. Region Since 1930

Forest fires in 1952 on federal, state and private forest lands in the 14 northeastern states resulted in the most damaging fire season recorded in recent years. Heavy drought over a wide area and through most of the year rolled up the greatest total forest land area burned in the region as a whole in the past 28 years.

The total acreage of commercial forest land reported by the 14 northeastern states as burned over last year was 1,676,251 acres, a summary by U. S. Regional Forester Charles L. Tebbe has reported. Total damage was estimated at $11,478,988 including watershed, recreational and timber loss values.

The extent of burn in 1952 was only 2,000 acres less than in 1930, the previous greatest loss in recent times. The number of fires reported was 17,648 as against a five-year average of only 12,473 and the average size of fires, 95.1 acres as against 17.9 acres.

The acreage loss, the number of fire occurrences and the excessive loss per fire in the eight states which suffered most heavily was a distinct setback to a record of forest fire prevention and suppression which has consistently improved in the region as a whole over more than 30 years under a cooperative federal-state-private protection program.

Only one state, Delaware, had a smaller loss in both numbers of fires and acres burned than in 1951. Four additional states, New Hampshire, Massachusetts, New Jersey and Rhode Island, reported a smaller burn, but a greater number of fires. These five states, plus Vermont, showed a better record for 1952 than the five-year average.

Such setbacks occur, though not usually so severely, in bad fire years which can be expected periodically. The fire season started earlier than usual in the spring over a large part of the region. Drought conditions developed during the summer and continued through October ending about November 11 in most of the region. Maine experienced one of the driest years since 1900 and had a critical period with many fires in July and August.

Elsewhere in the region the most severe fire season occurred in October and November. Many states had no appreciable rain for periods of 40 or 50 days in the fall. This was the period when the most extensive damage was done. In Pennsylvania, West Virginia and Kentucky the fall fire season was

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the worst on record—while in Virginia, conditions were unmatched for at least a decade.

In commenting on the preparedness of the state forestry agencies for fire protection and their expenditure of federal, state and private funds for the purpose, Regional Forester Tebbe commended the advances in recent years in research toward anticipating fire occurrence and in developing modern fire fighting organizations and equipment.

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Industry

Area of Tree Farms Continues to Grow

According to the progress report issued by the American Forest Products Industries, Inc., as of April 1, 1953, there are 4,267 tree farms in the United States totaling 27,908,158 acres. Of all regions, the South leads with 2,267 tree farms totaling over 16 million acres.

Kimberly-Clark Undertakes Insect-Disease Study

The Kimberly-Clark Corporation has established a laboratory at Iron Mountain, Michigan, for applied research on insect and disease damage to forest trees and pulpwood. It is reported to be the first of its kind in the United States to be set up by private industry.

The new laboratory is manned by a forest pathologist and a forest entomologist, employed two years ago by the company.

Company executives point out that increasing knowledge of forest management makes it necessary to know more about insects and diseases which cause loss to trees and pulpwood. Successful fire control effort has made it possible to turn attention toward other causes of forest damage.

Present studies include prevention of damage to plantations by white grubs; determining conditions that predispose decay in balsam fir, making it unfit for pulpwood use; and canker damage to poplar. Various investigations aimed at preventing insect damage include study of tent caterpillars and of the budworms which attack spruce, balsam and jack pine. Research is trying to find out how parasites and viruses may be used to fight the budworm and how forest management practices may best assist in the control of these insects.

A spraying project is underway to determine proper control measures for wood borers that attack pulpwood in the wood yards.

The results of the company's research will be made available for other forest land owners in the Lake States region.

Trees for Tomorrow Reelects Officers

At its ninth annual meeting held at Merrill, Wisconsin, Trees for Tomorrow, Inc. reelected the slate of officers

which has steered the Wisconsin industry-sponsored forestry organization since its founding in 1944: president, Folke Becker, Rhinelander Paper Co.; vice-president, E. B. Hurst, Consolidated Water Power and Paper Co.; second vice-president, C. G. McLaren, National Container Corp.; secretary and treasurer, D. B. Smith, Wausau Paper Mills; executive director, M. N. Taylor, Merrill.

George Kilp, Nekoosa Edwards Paper Co., and M. H. Frank, Wisconsin Power and Light Co., were named to the board of directors.

Louisiana Company Plants 18 Million Trees in Single Season

The Gaylord Container Corp. of Bogalusa, La., during the planting season just closed, planted 18,630,000 seedlings on 24,770 acres in Louisiana and Mississippi, according to Paul Garrison, Gaylord's chief forester.

This acreage is more than three times greater than the previous record of 7,694 acres during the 1951-1952 season and makes a total of 98,843 acres planted since 1920 by the company.

Planting cost, Garrison said, ran $8 to $10 per acre. About 80 percent of the planting was done by hand.

The seedlings, which included 17,555,000 slash pine, 275,000 shortleaf and 800,000 loblolly, came from state nurseries at Kinder, La., Winona and Mount Olive, Miss., and from Gaylord's own nursery at Morgantown, Miss.

Garrison estimated that from 600 to 850 persons were employed in the planting operations. The company, by policy, uses hand labor for planting when it is available.

Garrison said that insofar as company officials know, the Gaylord holdings constitute the largest privately-owned man-planted forest in the world.

Industrial Organization Leaders Chosen

Charles R. Ranson, Harahan, La., has been elected president of the Southern Hardwood Producers, Inc.

B. F. Morse, Long-Bell Lumber Co., Longview, Wash., is the new chairman of the Industrial Forestry Association.

Oswald Lightsey, Miley, S. C., has been named the new chairman of the Southern Pine Industry Committee.

G. E. Karlen, Eatonville Lumber Co., Tacoma, Wash., has been elected president of the West Coast Lumbermen's Association.

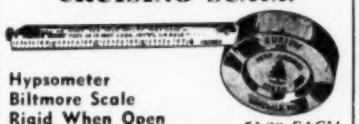
James Bemis, Ozan Lumber Co., Prescott, Ark., has been reelected president of the Southern Pine Association.

U. R. Armstrong, Halleck and Howard Lumber Co., Cascade, Idaho, is the new president of the Western Pine Association.

Southern Pine Association Annual Meeting

Lumbermen from throughout the South gathered in New Orleans April 8-10 to view a multi-million dollar machinery exposition said to be the largest of its kind ever held in the world.

COMPLETE INVENTORY CRUISING SCALE



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NEW - REVOLUTIONARY for marking trees!

a GUN that cleans itself

a CAN that screws on the gun

a PAINT you don't have to mix

3 SAVINGS IN ONE

Save hours of tedious stirring, thinning, straining paint! Eliminate messy funnels, canteens, gun cans! End the chore of cleaning guns every night!

Working with professional foresters, Nelson's chemist-engineers have developed the first paint, the first container, the first gun designed especially for marking trees.

The new Nelson Tree Marking Paint does not settle, thicken, or skin over—can be used direct from the can with no mixing. It is durable, not absorbed into wood or bark, retains high visibility—offers every property foresters have long wanted . . . (every color, too—yellow, white, orange, blue, red).

Packed in disposable, easy-to-carry quarts, the paint can screws directly onto the special new NEL-SPOT Tree Marking Gun. You just throw away used up cans, and save time, paint, equipment now wasted in extra handling.

The NEL-SPOT gun has a reversible tip in the nozzle to blow out dirt, a cap to prevent paint drying in the gun, a cleaning wire set in the cap to keep the orifice open.

For details on this revolutionary, time-mess-and-money-saving combination, WRITE:

THE NELSON COMPANY
1234 Prospect Avenue
Iron Mountain, Michigan

The machinery show, sponsored by Southern Pine Association, was held in conjunction with the S.P.A. 38th annual meeting.

Machinery used in forests, mills and re-manufacturing plants was shown. It was shipped to the exposition from 21 states and Germany, Sweden, and England.

Centered around the machinery show, the meeting was based on a theme of mechanical progress. Among the headline programs were sessions on laminated lumber and two-way industrial radio. The third day of the convention was set aside as "Mill Manager's Day," with discussions based on new developments in manufacturing.

K.M.G. Committee Selects Officers

The Keep Minnesota Green Committee, at its annual meeting held in Bemidji, February 12th, elected Dr. F. H. Kaufert as chairman and Leland J. Melrose, Farm Bureau news editor, as vice chairman. The following board of directors was elected: Roy T. Anderson, Austin; Walter L. Fredrickson, Duluth; Roy E. Halvorson, Duluth; A. G. Kalbrener, Cloquet; F. G. Fitz-Patrick, Chicago; M. L. Hibbard, Duluth; R. S. Horton, Winona; E. J. Jankowski, Cloquet; Paul H. VanHoven, Duluth; George L. Peterson, Minneapolis; R. T. Elstad, Duluth; Walter H. Honebrink, St. Paul; R. V. St. Amant, Ely; E. N. Duncan, St. Paul; J. B. Faegre, Minneapolis; T. A. Wark, Sartell; D. M. Pattie, St. Paul; Robert S. MacFarlane, St. Paul; and C .H. Schacker, St. Paul.

Dr. C. V. Hobson, Bemidji State Teachers College, long active in conservation work, received the K.M.G. Committee Senior Award for his achievements in the field.

Executive Director Hugh D. Bennett, stated that the 1952 fire hazard in Minnesota was one of the worst on record but the final fire statistics revealed losses were nominal. A total of 47,300 acres was burned by 1,235 fires. The newspapers, radio and TV stations were paid high compliments by Bennett for the excellent coverage given during the high hazard periods.

St. Regis Paper Co. Awards Forestry Fellowship

St. Regis Paper Company has announced the award of its fellowship in forestry to Rexford A. Resler, a senior at Oregon State College, who plans to continue in graduate work at that school next fall.

This fellowship was offered by St. Regis last fall to first degree holders planning to take graduate work at any accredited school of forestry in the United States. At the same time it offered five undergraduate scholarships in forestry, effective in the academic year 1953-1954.

The St. Regis scholarships were announced in the January issue of the JOURNAL OF FORESTRY.

A.F.P.I. Announces 4-H Forestry Awards

American Forest Products Industries, Inc. has announced its 1953 4-H forestry awards program—the fifth year that such a program has been offered.

Purpose of the program is to encourage 4-H boys and girls to understand the importance of forest and farm woodlot conservation, to learn and use good forestry practices, and to understand the importance of forest fire prevention.

Awards are offered on state, sectional and national levels and include all-expense trips to the 32nd National 4-H Club Congress in Chicago, as well

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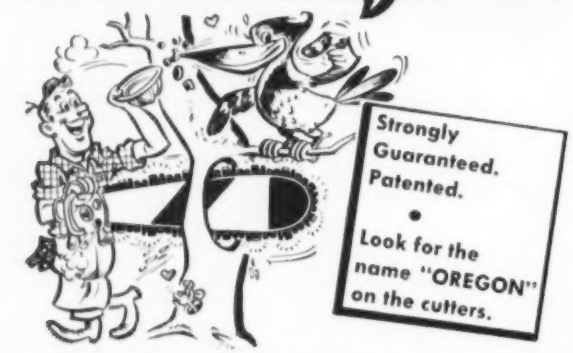

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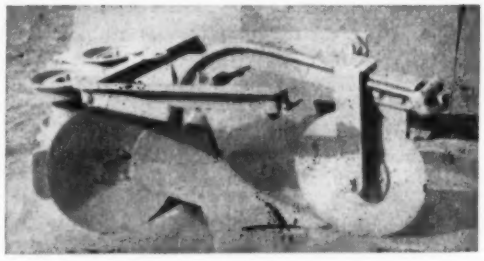


STOP THAT FIRE
RANGER PAL JR. FIRE PLOW

The Ranger Pal Junior fire plow is a hand or hydraulic lift middle-buster with coulter and discs. Drawbar connection built of 1" cast steel T-beam. Has 16" coulter roller bearing assembly with grease seal, mounted ahead of 14" tempered steel middle-buster, capable of cutting large underground roots. One 16" harrow disc bearing assembly is mounted on each side and slightly behind the middle-buster wing which turns the sod over and out. Depth of plowed line may be adjusted by either the presence or absence of two spool weights attached on rear of plow. Leaves a 5 foot earth line and can be drawn by any piece of light equipment, Ford type tractor, jeep or power wagon. Built compact and sturdy for ease in handling and reduced maintenance costs. Tested and proven by Louisiana Forestry Commission. Made by makers of Ranger Pal Fire Plow. Not designed to supersede the Ranger Pal but adapted for lighter equipment. Mass production price at $385.00 each, f.o.b. shop. Workmanship guaranteed.

Ranger Pal Fire Plow production price at $495.00 each f.o.b. shop.
Write for further details on both plows.

TWIN CITY WELDING & MACHINE SHOP
301 Jonesboro Highway
WEST MONROE LOUISIANA

as four college scholarships of $300 each.

In 1952, more than 37,000 members in 40 states competed for the awards, and the A.F.P.I. estimates that close to 170,000 boys and girls received some 4-H forestry training in that year.

N.L.M.A. Grants 4 Scholarships

The National Lumber Manufacturers Association has awarded four $500 scholarships to outstanding forestry school students.

The winners, chosen from students nominated by 15 of the nation's forestry schools, are: Douglas Neil McClary, 21, of Anacortes, Wash., a student at the University of Washington; Donald Gene Butler, 22, of St. Paul, Minn., a student at the University of Minnesota; William Ralph Francis, 27, of Seattle, a student at Yale University; and Bruce Redmond Jones, 25, of Springfield, N. J., a student at the University of Michigan.

The four scholarship winners will receive ten weeks of summer training at the Washington, D. C., research laboratory of the Timber Engineering Co., an affiliate of the N.L.M.A. To defray their expenses, each scholarship winner will receive $500, plus travel expenses.

The scholarship program, now in its fourth year, is designed to encourage more technically-minded forestry students to prepare for employment in wood utilization with private wood industries.

The winners were selected by representatives of the lumber industry on the basis of scholastic ratings, general aptitude and the recommendations of the deans or department heads of participating universities.

Award Presented to Forest Farmer Magazine

A Certificate of Merit was recently presented to *The Forest Farmer* magazine for "meritorious service in the field of forestry education" by the department of forestry and Sylvans Club of Stephen F. Austin College, Nacogdoches, Texas.

The magazine is the official publication of the Forest Farmers Association, Valdosta, Ga. J. Walter Myers, Jr. is editor, as well as the association's executive secretary. J. V. Whitfield of Burgaw, N. C., is president.

During 1952 the association launched an educational program by devoting a page of each monthly issue to information on forestry for school use.

Allied

Colliers Draws Attention to Mining Law Abuses

Collier's Magazine describes, in the April 11 issue, how mining laws allow private citizens to file so-called mining claims on public lands and then use the lands for their own purposes, usually not for mining. Collier's filed its own claim for 20 acres (which it says it will now give up) in the Arapaho National Forest in Colorado, on land lying across a proposed new transcontinental highway, and for which the magazine paid $1.25 in fees to a county clerk.

The article gives examples of the misuse of these claims and reports some of the solutions which have been suggested to correct the practice. Written for the layman, the article points out a serious situation that has been of concern to conservationists for some time.

F.P.R.S. to Meet in Memphis, June 15, 16, and 17

The Forest Products Research Society will hold its seventh annual national meeting in Memphis, June 15, 16, and 17.

The seven main sessions will cover the following subjects: quality control, glues and gluing, chemical utilization, containers and protective packing materials, wood finishing, wood composition board, and wood machining and equipment.

R. D. Pauley, Weyerhaeuser Timber Co., is technical program chairman of the meeting.

Eighth Pacific Science Congress

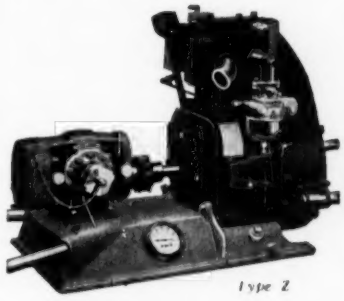
Fourteen Pacific countries will take part in the Eighth Pacific Science Congress to be held November 16 to 28, 1953, at the University of the Philippines, Quezon City, P. I.

Of interest to foresters will be symposiums on reforestation and Pacific conservation, management and utilization of natural resources, and plant geography.

The United States is represented in the Pacific Science Association, which sponsors the congress, by K. A. Ryerson, of the National Research Council. Included in the standing committees of the associa-

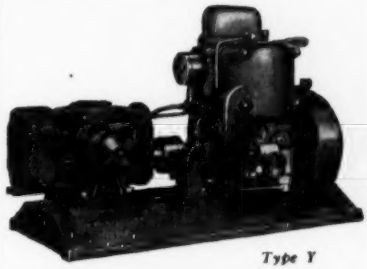
"Almost 30 Years Old and Still Going Strong"

That's what owners report about some of earliest models of Pacific Pumpers ever built.



Type Z

WHEN THE FIRST Pacific Pumper was introduced, it was a startling innovation. To produce an efficient pump light enough to carry by hand into rugged terrain but powerful enough to deliver an effective flow of water to combat forest blazes was news of national importance. Today, after nearly 30 years, many of the earliest Pacific Pumpers are still in use and are still the favorite of experienced fire fighters . . . mute testimony to the stamina and dependability built into all Pacific Pumpers . . . and to Pacific Pumper's policy of supplying parts for even the earliest models.



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Years of engineering research and thousands of practical field tests made possible the improvements incorporated in the famous Type Y Pacific Pumper . . . the most powerful unit ever built for its weight and size. The Type Y Pacific Pumper quickly won the approval of experienced fire fighters and fire fighting authorities . . . and is still the standby of many of the nation's most practical forest fire fighters. Newer, post-war models of Pacific Pumper are now available . . . all even lighter, more compact and durable and more versatile for a variety of purposes.

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By W. B. GREELEY, Vice-President, West Coast Lumbermen's Assn. *American Forestry Series.* 278 pages, $5.50

An excellent study of the best known American foresters of forest policy in the United States and abroad. The policies of eighteen foreign countries as well as our own history are discussed as background to an understanding of forces now working out an American forest policy by a democratic process of experience and cooperation.

FOREST MENSURATION

By DONALD BRUCE, Consulting Forester, Portland, Oregon, and FRANCIS X. SCHUMACHER, Duke University. *American Forestry Series.* Third Edition. 483 pages, $7.00

The fundamental concept of this text is based on a belief of the authors that the best way to teach forest mensuration is to teach the student how to use its tools. The arrangement of material follows a classification of the technique required, rather than the subject to be studied. All common problems of mensuration are illustrated by modern practices, and a chapter has been added on the mensurational phases of using aerial photographs in timber cruising.

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A new edition of this successful book, describing the important forest trees of the United States and Canada. Nearly 250 species of trees are covered in detail, and most of the descriptions include distinguishing characteristics, general description, range and botanical features.

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tion are committees on forest resources of the Pacific area, distribution of terrestrial fauna of the inner Pacific, Pacific conservation, Pacific plant areas, soil and land classification in the Pacific area, and systematic Zoology.

Education

Southern Educators Announce Brochure on Forestry Careers

The Southern Regional Education Board has announced the preparation of an informational brochure on forestry as a career, designed to draw the attention of high school seniors to opportunities for forestry training in the South.

The brochure will be bright and graphic, and is being prepared by the Committee on the Regional Program in Forestry Education and Research. It is being financed jointly by the Southern Regional Education Board, and the six accredited forestry schools of the region—Alabama Polytechnic, Duke University, Florida State University, Louisiana State University, North Carolina State College and the University of Georgia.

Mausteller on Colombian Point Four Assignment

Since January 1952, John E. Mausteller, instructor in the Forestry Department of Michigan State College, has been on a Point Four assignment in Medellin, Colombia to assist in the establishment of a forestry school for that country.

John E. Mausteller

Mr. Mausteller received his B.S. degree in forestry from Pennsylvania State College and has taken graduate work in forestry from Michigan State College. His professional experience includes assignments with the New Jersey Department of Conservation and Development; land management with R. C. Roebling; chief tie and timber agent for the Seaboard Railway; and chief forester and wood administrator for the Halifax Paper Company. In 1949 he joined the staff of Michigan State College as an instructor in the Forestry Department. Mr. Mausteller is a member of the Society of American Foresters and a member of the Xi Sigma Pi.

The Colombian Forestry School started modestly in 1952 with an initial class of six students. Mausteller feels that this is a fairly good representation, however, since the entire school of agriculture has less than 100 students registered. In addition to his teaching duties, he is aiding in organizing a forest nursery, a forest research program, and a forestry extension service. Both native and exotic species from the new forest nursery will be planted this season. Experimental reforestation plots have been established on a mountain farm purchased by the college for research purposes. In addition, several extension bulletins are now in the process of publication, covering forestry activities. Mr. Mausteller plans to remain in Colombia until January of 1954.

Idaho Dean Retires

D. S. Jeffers, dean of the University of Idaho School of Forestry, is to retire June 30. He has been head of the forestry division of the university for 17 years.

Univ. of Washington Holds Forest Soils Symposium

A forest soils symposium was held March 26 and 27 at the University of Washington, as one of a series of meetings aimed at developing interest in the field of forest soils as it relates to all phases of forest management. Members of the timber industry in the states of Oregon and Washington, together with state and federal foresters, attended.

The Forest Soils Committee of the Douglas-fir region held its quarterly meeting at the end of the first day's program, and outlined plans for publishing a manual of forest soils. Chairman of the committee is George Schroeder of Crown Zellerbach Corp.

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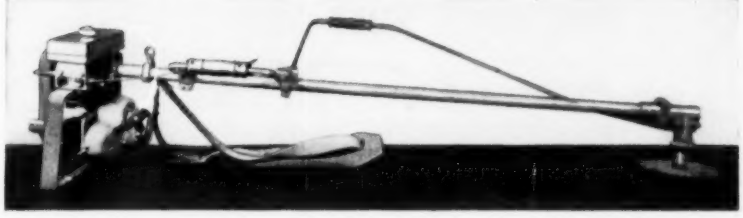
Watch for big ads in Saturday Evening Post, Time, Argosy, Country Gentleman! Cadillac convertible, cash prizes awarded just for visiting nearest Brushmaster Dealer, obtaining entry blank, and writing a few words about this new machine! Contest ends midnight July 31st, 1953.



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Zumwalt Leaves Yale to Accept Federal Position

Eugene V. Zumwalt of the teaching staff of the Yale School of Forestry has been named assistant regional forester for the Bureau of Land Management at Anchorage, Alaska.

Government

State Association Executives to Meet

The Council of State Forestry Association Executives will hold its annual meeting on June 17 and 18 at Fort Monroe, Virginia.

The council was organized in 1949 at a meeting held in North Carolina under the sponsorship of the American Forestry Association. Since then meetings have been held in New Hampshire, Ohio and Texas.

Purposes of the council include increased knowledge by state forestry associations of the problems and successful procedures of other similar organizations, together with discussion of national problems of importance to state groups.

Charles Burdick Retires from Alaska Service

Charles G. Burdick, assistant regional forester for the national forests of Alaska, retired March 31 after an active career of 35 years of federal service, 30 years of which was in the Forest Service.

Charles G. Burdick

Mr. Burdick was first assigned to Alaska in 1927, four years after he entered the Forest Service in Montana. In 1935 he was put in charge of field inspection of timber sales for the regional office in Juneau and became assistant regional forester in 1941.

During the 1930's one of his special assignments was direction of C.C.C. projects throughout the territory. He was loaned to the Department of the Interior for a year in 1939-40 to purchase the non-native-owned reindeer in Arctic Alaska. During World War II he organized the Alaska Spruce Log Program for the War Production Board to secure airplane-quality Sitka spruce from the Tongass National Forest. He has been actively involved in the development of plans by the Forest Service directed toward providing a firm foundation for an expanding and permanent timber industry in Alaska.

He and Mrs. Burdick intend to continue to maintain residence in the territory.

TWO-GALLON PAINT GUN

With Built-in air pressure pump

Tested in many localities for five years. Users are enthusiastic about economy and durability. Very light weight. Multi-purpose: for tree spotting with cold water paint; for applying poisons on undesirable species; for applying debarking compounds; for using as an emergency water pump in mopping up fires. Has in some cases doubled tree-marking daily output per man. Easily carried in comfortable pack carrier with frame and harness. For sale by all Poulan Chain Saw dealers and

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370 pages, 18 plates, Cloth bound, $4

Published in December, 1950. This history of forestry tells the dynamic story of the growth of forestry technique and practice of forestry in the United States.

Walter Bond Retires from Southern Research

Walter E. Bond, senior forest economist at the Southern Forest Experiment Station, New Orleans, has retired after more than 23 years with the U. S. Forest Service.

Mr. Bond joined the southern station in 1929. Since then he has conducted research and issued publications on costs and returns of forest management in Mississippi, Louisiana, Arkansas, Texas, and other southern states. He has helped show that conservative timber management can be highly profitable in the South and thereby has helped lay the foundations for the improved management and increased wood-using industry that the southern states have experienced since the close of World War II.

Prior to 1929, Bond worked for the state forest services of Vermont and Texas. During the first World War he was in France with the 20th Engineers, a forestry regiment.

Walter E. Bond

In early April, Mr. and Mrs. Bond left for an extended tour of Europe where he will study all-aged management practices in Britain, Germany, and Switzerland. The Bonds also plan to visit Austria, France, Holland, Italy, and Spain.

Tree Improvement Committee Formed for Lake States

A Lake States Forest Tree Improvement Committee, to encourage and coordinate forest genetics activities in Minnesota, Wisconsin, and Michigan, has been formed, according to an announcement by M. B. Dickerman, director of the Lake States Forest Experiment Station, St. Paul, Minnesota.

The committee grew out of a conference of 56 forest scientists to report forest genetics research under way in the Lake States, discuss urgent

This pouring cap attachment was selected through extensive tests as best suited to the foresters' needs. This cap, which screws on SOUTHERN GLO's new small-opening flat container for ready-mix tree marking paint, is yours free with your order. Please specify whether you can use one, two or half a dozen.

If the procedure described by Mr. T. A. Liefeld, consulting forester from Thomasville, Ga., is the pattern followed by most foresters, the new SOUTHERN GLO pour type container is a natural: "In my marking, I carry a gallon of paint in a rectangular can . . . on my back in a pack sack. To the spout of this can I have attached a home-made spout. This gallon, plus the quart in the marking gun usually lasts me until noon when I return to my car for lunch and to refill for the afternoon's marking." We believe the new pouring cap available with your SOUTHERN GLO order, will be quite an asset to easy, spill-proof pouring. This flexible hose pouring spout came out a close second in usage tests. For those who prefer this, we find it is available at most auto accessory stores.

In testing the various pouring spouts, foresters noted a tendency of all attachments to make paint surge, because air is trapped in the can.—The pouring cap seems to have a slight edge in this respect. However, you can eliminate this entirely by punching a nail hole in the can at the point highest when can is in pouring position.

Because of the favorable reaction of Mr. Liefeld and a number of other foresters, the makers of SOUTHERN GLO have adopted the small-opening pour-type can (—packed 6 to a case) as standard container for ready-mix tree marking paint. If you prefer the round can (packed 4 to a case) please specify this on your order. Unit price is the same, regardless of container style, and of course, we will continue to supply SOUTHERN GLO paste in the round can, for thinning to your specifications.

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TREE PLANTER PLANTS
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problems still to be tackled, and explore means of doing more forest genetics work in the region. Represented were foresters, geneticists, plant pathologists, entomologists, and biologists from the universities, state conservation departments, forest industries, and federal agencies of Minnesota, Wisconsin, Michigan, and also Ohio, Ontario, Massachusetts, and California.

The new committee consists of Earl J. Adams of the Minnesota Conservation Department; B. L. Berklund of the Nekoosa-Edwards Paper Co; W. H. Brener of the Wisconsin Conservation Department; F. J. Hodge of the Michigan Conservation Department; A. J. Riker of the University of Wisconsin; P. W. Robbins of Michigan State College; T. Schantz-Hansen of the University of Minnesota; Stephen H. Spurr of the University of Michigan; and Paul O. Rudolf of the Lake States Forest Experiment Station, as chairman.

Eberly Retires

Howard J. Eberly, assistant chief, Division of Cooperative Forest Protection, U. S. Forest Service, retired in April following 25 years of government service. Mr. Eberly's cooperative work with state and private foresters has made him widely known in those fields as well as in the federal service.

New Appointments to Alaska

Three Pacific Northwest men have been appointed to top positions in the Alaska region of the U. S. Forest Service.

Arthur W. Greeley, assistant to the director of the Pacific Northwest Forest and Range Experiment Station in Portland, Ore., has been named regional forester for Alaska (as was reported in the May JOURNAL), succeeding B. Frank Heintzleman who was appointed governor of the territory. In his new position, Greeley will be responsible for the administration of more than 20 million acres in the Chugach and Tongass National Forests which are particularly valuable as a potential source of pulpwood. It is estimated that they could supply a million tons of pulp per year forever. One mill with a daily capacity of 350 tons is already under construction.

John L. Emerson, assistant to the Department of Agriculture's representative on the Columbia River Basin Commission in Portland and formerly supervisor of the St. Joe National Forest in Idaho, has been appointed assistant regional forester in charge of administrative management and engineering. William H. Johnson, supervisor of the Snoqualmie National Forest with headquarters in Seattle, will be assistant regional forester in charge of timber, recreation, and lands. He succeeds Charles G. Burdick.

William H. Johnson

Greeley was first employed by the Forest Service as a lookout on the Snoqualmie National Forest during the 1932 field season while attending forestry school. After appointment to a junior ranger position in Idaho in 1935, he served on national forests in Montana, Idaho, and California as ranger, timber management staff officer, assistant supervisor, and supervisor before assuming his present position in 1951.

The new regional forester also worked on flood control surveys in Montana and served as timber management assistant in the office of the chief forester in Washington, D. C. between 1944 and 1947. The son of William B. Greeley who was chief of the Forest Service from 1920 to 1928, he received a bachelor's degree in forestry from the University of Washington in 1934 and a master's degree in forestry from Yale the following year.

Emerson is a 1928 graduate of the University of Montana forestry school. Prior to his appointment as district ranger on an Idaho national forest in 1944, he worked as agent for the Bureau of Plant Industry and was Nebraska state director of the federal shelterbelt project. From 1942 to 1944, he was employed on the Guayule Emergency Rubber Project in California.

Since 1944, he has served successively as ranger, assistant supervisor,

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supervisor, and finally staff officer in the Missoula, Montana, regional office division of recreation and lands until his Portland assignment.

Johnson worked seasonally from 1925 to 1934 on various protective jobs on the Olympic National Forest in Washington. In 1935 he was appointed as fire training foreman and in 1939 placed in charge of a C.C.C. side camp as forestry and conservation instructor. He became timber sales officer on the Soleduck district of the Olympic forest in 1941 and the following year he was transferred to the Wind River district of the Gifford Pinchot National Forest in southwestern Washington to do timber sale work. In 1943 he became ranger in charge of the Wind River district. In 1946, he returned to the Olympic forest as staff officer in charge of fire control, engineering, and recreation and lands. He was promoted to assistant forest supervisor in 1947 and advanced to supervisor in 1950.

S.C.S. to Administer U.S.D.A. Flood Prevention and River Basin Work

Secretary of Agriculture Ezra Taft Benson has assigned to the Soil Conservation Service general responsibility for administering all flood prevention activities and river basin investigations of the department.

Subject to policies established by the Secretary and under the over-all guidance of Assistant Secretary J. Earl Coke, a directive gave S.C.S. the job of developing standards and procedures for the department's flood prevention program, and for planning and scheduling watershed surveys and installation of flood prevention measures in watersheds authorized by congress.

Where watersheds include national forest lands, the Forest Service will make preliminary examinations and surveys and carry out needed treatment on national forests, on range lands adjacent to and used in conjunction with national forests, and, in cooperation with state forestry agencies, on other forest lands within the watershed or basin.

Heretofore the department's flood prevention activities have been administered by a staff in the Secretary's

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office and leadership for field work was delegated to S.C.S. or Forest Service, depending on the predominant use of land within a watershed. Giving responsibility to these agencies will expand and increase the work, in the opinion of Mr. Coke.

In addition to flood prevention activities authorized under the Flood Control Act of 1936 and later amendments and supplements, the Department of Agriculture is taking part in several river basin investigations. These studies and preparation of reports including the agricultural phases of plans for development and improvement of such basins are now the general responsibility of the Soil Conservation Service, working with other agencies within or outside the Department of Agriculture.

Dorman Heads Hitchiti Research Center

Keith W. Dorman, of the Southeastern Forest Experiment Station, U.S.F.S., Asheville, N. C., has been promoted to head the Hitchiti Research Center, Macon, Georgia.

Dorman has been with the Forest Service 19 years and for the past 5 years has been staff assistant in the Division of Forest Management in the Asheville office of the station.

The research center, a branch of the southeastern station, was established in Macon to find ways and means of raising the yield of pine-hardwood forests in lower Piedmont Georgia, Alabama, and South Carolina.

F. H. Raymond Becomes Calif. Deputy State Forester

F. H. Raymond, deputy state forester in charge of the north coastal region, of California, was promoted May 1 to chief deputy state forester, with headquarters in Sacramento, it was announced by State Forester DeWitt Nelson. Mr. Raymond has been with the division for 22 years. He succeeds C. R. Clar, who is being placed on special assignment duty in the state forester's office.

Texas to Undertake Grazing Survey

The Texas Forest Service has announced that a cooperative forest grazing survey will be made in the southeastern part of that state this spring to determine the extent that East Texas woodland are grazed. The survey will be a cooperative undertaking of the Texas Forest Service, the Texas Agricultural Experiment Station, and the Southern Forest Experiment Station of the Forest Service.

The survey will deal primarily with cattle grazing, but the problems presented by hogs, sheep and goats will be included where these animals graze the forest. From the survey, problems requiring research will be ascertained.

Norway Pine Becomes Minnesota's Official State Tree

Governor C. Elmer Anderson signed a bill on February 18 making the Norway pine the official state tree of Minnesota. Clarence Prout, director, Division of Forestry of the Department of Conservation, was present at the signing ceremony in company with representatives of women's groups who sponsored the bill.

Louisiana Studies Forest Taxation

A special group of legislators, public officials, tax authorities, and landowners have been invited to serve on a committee to design a modern system of taxation which would encourage greater production from Louisiana's timberlands. The special committee, formed by invitation of the House Forestry Committee of the state legislature, hopes to devise a taxation system "that would separate the land from the growing timber for assessment purposes, and set a severance tax on the timber crop to be paid at any time timber is cut."

W. Va. Revises Fire Laws

West Virginia's forest fire laws have been revised by the 1953 legislature.

Conservation Commission Director Carl J. Johnson said that the spring forest fire season began March 1 and will continue until May 31. The fall fire season will open on October 1 and close December 31. This change provides for one full month more in each fire season, since in previous years the spring season opened March 20 and closed May 20 while the fall season opened on October 15 and closed December 15.

Permits to burn brush, slash, grass, stubble, or other debris within 300 feet of forest land are no longer required, but the amendment provides that, "No person shall during the fire season, except between the hours of 5:00 p.m. to 5:00 a.m. set on fire or cause to be set on fire any forest land, grass, stubble,

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Forestry Employment

S.A.F. members are privileged to insert one 60-word advertisement in this column without charge. Forest industries desiring to employ foresters may insert advertisements at the rate of $4 per column inch. Copy must be received by the end of this month for an advertisement to appear in the issue after next.

Obviously, the Society cannot assume responsibility beyond making it possible for prospective employee and employer to enter into negotiations.

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Box E, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, 39, BSF, over 17 years' experience in forest and wildlife management, protection, reforestation, and utilization with state and federal agencies. Currently employed in an administrative capacity. Details and references furnished on request. Desires change to position with future economic security. Northeast or Lake States region preferred.

Box F, Journal of Forestry, Mills Building, Washington 6, D. C.

brush, slash, debris or any other inflammable substance on either his or the property of another."

The new law applies to outdoor burning anywhere in the state, regardless of the distance from the woodland. The law further states that, "If any such burning results in the escape of fire and injury to the property of another, such escape shall be prima facie evidence that the burning was not safe and was in violation of this section. Industrial and special permits may be issued by the director or his authorized representatives."

Forest Statistics for Arkansas

Arkansas forests appear to be growing more timber than is being cut, according to a new report on the state's forest resources.

The report, released by State Forester Fred Lang and by Director Harold L. Mitchell of the Southern Forest Experiment Station, summarizes the results of the second Forest Survey of the state, made between 1947 and 1951. The station made the survey in cooperation with the Arkansas State Forestry and Parks Commission. Except for the Ozark region, the state was previously surveyed between 1934 and 1936.

Arkansas' forests are growing about 2.2 billion board feet yearly in trees of saw-timber size, the new survey found. About half this growth is on pine trees and half on hardwood. In 1948, when the latest cutting statistics were compiled, logging removed 2.1 billion board feet, also half pine and half hardwoods.

For merchantable trees of all sizes 5 inches in diameter and larger, softwood growth exceeded cutting slightly and hardwood growth was 60 percent greater than the cut.

Nearly six-tenths of the state's total land area of 33.7 million acres is in forest, according to the report. The proportion of forest is highest, 71 percent, in the southwest. Widespread land clearing has left the Delta region the least forested—only 37 percent. Eighty-five percent of the forest in the state is in private ownership.

Arkansas' supply of saw timber is 37 billion board feet. The volume in all merchantable trees above 5 inches in diameter is 10 billion cubic feet. More than four-tenths of the volume is in softwood species, chiefly loblolly and shortleaf pines. Of the hardwoods, oaks, gums, and hickories are most abundant.

Although timber now appears to be growing slightly faster than it is being cut, the total volume of timber in the resurveyed part of Arkansas is less than in 1935. The trees are also of smaller average size. This inventory shrinkage is partly a result of strong timber markets during and since World War II, and partly of land clearing in the Delta.

The forests of the Delta contain 7.2 billion board feet of saw timber, largely hardwood, or 22 percent less than in 1935. The forested area also decreased about one-fifth.

The Ouachita Mountains have 5.9 billion board feet of saw timber, about two-thirds pine, or 6 percent less than at the time of the first survey. The volume of all pines 5 inches in diameter and larger dropped 4 percent, whereas volume in hardwoods, especially small ones, increased considerably. This increase in the proportion of hardwoods is largely undesirable according to the report because in the Ouachitas pine is the more valuable tree.

In the Southwest, pine saw timber totals 11.3 billion board feet, and hardwoods 6.9 billion feet. The volume of all pines 5 inches in diameter and larger is 8 percent less than in 1936, while the volume in hardwoods increased 4 percent. The report states that while this is less pine timber than in 1936, the Southwest has made great progress in forestry. In a seven-county area there is now 33 percent more pine saw timber than in 1936.

Copies of the report may be secured from the Southern Forest Experiment Station, 2026 St. Charles Avenue, New Orleans 13, Louisiana, or from Mr. Lang's office at Little Rock, Arkansas.

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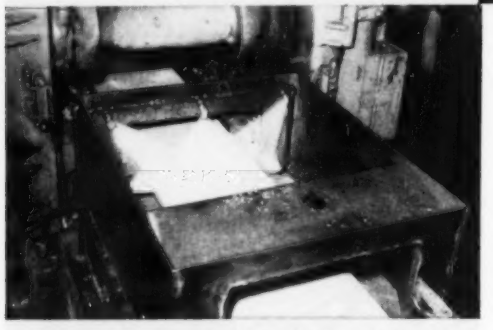
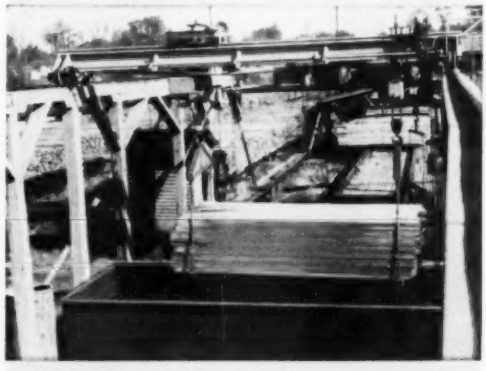
DIPPING—This photo shows a typical dipping vat located on the green chain. Overhead rollers force the freshly sawn lumber into the Permatox 10-S solution as it passes through the vat.



SPRAYING—Green timbers and large dimension can be sprayed by passing stock on a roller conveyor through a spray box fitted with nozzles or perforated pipes. (Cover removed.)



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